

***Big Spring Firemen's Relief and Retirement Fund***

***ACTUARIAL VALUATION REPORT***

**Actuarial Valuation  
as of January 1, 2021  
for the Plan Year January 1, 2021 through December 31, 2021**

August 9, 2021

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## Introduction

This report for the Big Spring Firemen's Relief and Retirement Fund presents the contribution levels to meet the adopted funding policy and shows the plan's funded status as of January 1, 2021. The disclosures required by GASB-67 have been provided in a separate report.

The report is presented in the following sections:

	Page
Highlights.....	1
Summary of Plan Provisions.....	3
Plan Assets.....	6
Plan Funding Requirements.....	15
GASB-25 Disclosure Information.....	20
Participant Census Data.....	23
Actuarial Method and Assumptions.....	26
Risk Assessment.....	26
Certification.....	31

## Highlights

The key findings of the valuation are as follows:

- The investment return on market value investment earnings for the prior two years was more than the long term actuarial assumption of 7.75%. The Fund had a 21.32% return on market value after expenses for the 2019 calendar year and a 13.42% return for the 2020 year. The average annual return on market since 1987 was 8.28%.
- The returns measured relative to the actuarial value of assets were different from the returns on market value because the actuarial value of assets is based on 5-year smoothing of investment returns in excess of (or short of) the long term actuarial assumption. The return on actuarial value of assets for 2019 was 7.64% and for 2020 was 13.29%. As of 1-1-2021 the actuarial value of assets was 92.36% of market value (down from 108.1% as of January 1, 2019), indicating a net deferred investment asset which will be recognized in future years. The significant experience loss in 2008 is no longer included in the 5 year averaging period.
- The unfunded actuarial liability of the plan increased by about \$1.057 million over the prior valuation. The key sources of this change are
  1. Rate of return on the smoothed actuarial value of assets is more than the long term assumption (but much less than the return on market)
  2. Contributions in excess of the normal cost but less than the 30 year funding requirement
  3. Pay increases to employees
  4. Mortality among the retired group
- The current contribution rate of 28% (13% from the members and 15% from the City) is sufficient to pay the normal cost (which is about 16.63% of participant payroll) and to amortize the unfunded actuarial liability over **33.69 years** from the 1/1/2021 valuation date. This is outside the 30-year standard previously adopted for the Big Spring FRRF and the recommended 30-year standard published by the State of Texas Pension Review Board (see pages 15-16 for a further discussion of funding standards).
- The amortization period was favorably affected by the investment returns for 2019 and 2020 as discussed above but much of the effect was absorbed by the asset smoothing method..
- To meet a fixed 30 year amortization period measured from 1-1-2021, a total contribution rate of 30.22% of pay would be needed based on actuarial value of assets (or 28.95% based on market value of assets). It is our understanding that the FRRF has adopted a closed 30 year amortization period (not rolling) measured from 1/1/2021 and the funding policy standard. This is in addition to other plan limitations included in the 2018 plan amendment.

**Recommendations**

1. Based on the funding level of the plan and current contribution rates, we recommend that no changes in the plan be made that would increase costs until the funded level of the plan improves. This is consistent with the PRB recommendation.
2. The funded status of the plan should be carefully monitored in the future with annual actuarial valuations, if possible. Investment return should be compared annually with the long term actuarial assumption.

Additional details are presented in other sections of the report.

## Summary of Plan Provisions

<b>Credited Service</b>	The number of years of continuous employment with the Fire Department of the City of Big Spring, Texas.
<b>Final average compensation:</b>	The monthly average salary during the five years in which the member earned the highest salary (or the three year average as of December 31, 2006, if higher). Compensation for members hired in 2018 and later is limited to base pay, certificate pay, longevity pay and LFSA required overtime.
<b>Service retirement eligibility:</b>	Attained age 50 with 20 years of service
<b>Monthly accrued benefit:</b>	A monthly benefit equal to 2.55% times years of service times final average compensation.
<b>Contributions:</b>	13% of compensation for member and 15% of salary for employer.
<b>Interest credited on employee contributions</b>	None
<b>Vested benefits:</b>	The monthly accrued benefit multiplied by the following percentages:

<u>Years of Service</u>	<u>Percentage Vested</u>
10	50%
11	55
12	60
13	65
14	70
15	75
16	80
17	85
18	90
19	95
20 or more	100

Deferred to the service retirement date (the later of age 50 and the date the member would have had 20 years of service had he continued his employment with the Big Spring Fire Department).

<b>Separation Benefit:</b>	Return of member contributions without interest for members terminating with less than 10 years of service.
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**Disability benefit**

A disabled member with 10 or more years of service receives his or her vested monthly accrued benefit without reduction for early payments.

However, if the disability is the result of a pre-existing condition, the maximum monthly benefit is \$100 regardless of service.

**Normal form of benefit:**

Monthly annuity payable for life with a guarantee that total monthly benefit paid shall not be less than the employee's accumulated contributions (installment refund guaranteed). Two thirds of the monthly benefit continues to the spouse of a deceased member until the spouse's death or remarriage.

**Death Benefits:*****Spouse***

66 2/3% continuation of benefits to spouse (in the event of the death of an active employee, the benefit amount is determined as for a Disability pension).

***Minor Children***

With spouse in payment status \$100 a month; with no spouse in payment status \$200 a month; the total of spousal and children's benefits may not exceed the employee's amount.

**2018 Plan Changes**

Increased the City contribution rate from 13% of pay to 15% of pay

Members hired in the future would have their average monthly salary determined using only base pay, certificate pay, longevity pay and FLSA required overtime.

The maximum retirement benefit is limited to 100% of adjusted final average pay (defined as final average considering only base pay, longevity pay and certificate pay).

Actuarial equivalence factors for early retirement were updated from 8% 1983 GAM mortality to 7.5% with RP2000 mortality.

Plan benefits may not be materially increased unless the funded level of the plan is at least 80% and plan funding is sufficient to amortize the unfunded actuarial liability over 25 years or less.

**DROP**  
(Deferred Retirement Option)

**Option 1**

- The Firefighter must retire within 5 years of a DROP election.
- The monthly benefit he will receive from the Plan will be determined based upon his salary and Service at the time of his DROP election.
- At the conclusion of the DROP period, the Firefighter will be paid an amount which is the sum of 1) his Employee contributions from the DROP period including interest at 4% compounded annually, plus 2) the product of his monthly benefit amount times the number of months of the DROP period. This amount must be paid within three (3) years in no more than three (3) installments.

**Option 2**

- Upon retirement, a Firefighter may elect to receive 85% of his regular monthly benefit (with all survivor benefits appropriately reduced) for life and a lump sum equal to 24 times this reduced benefit. This amount must be paid over three years in no more than three installments.

DROP benefits will be actuarially converted to a life only benefit for purposes of determining the "Maximum Service Retirement Benefit."

## Plan Assets

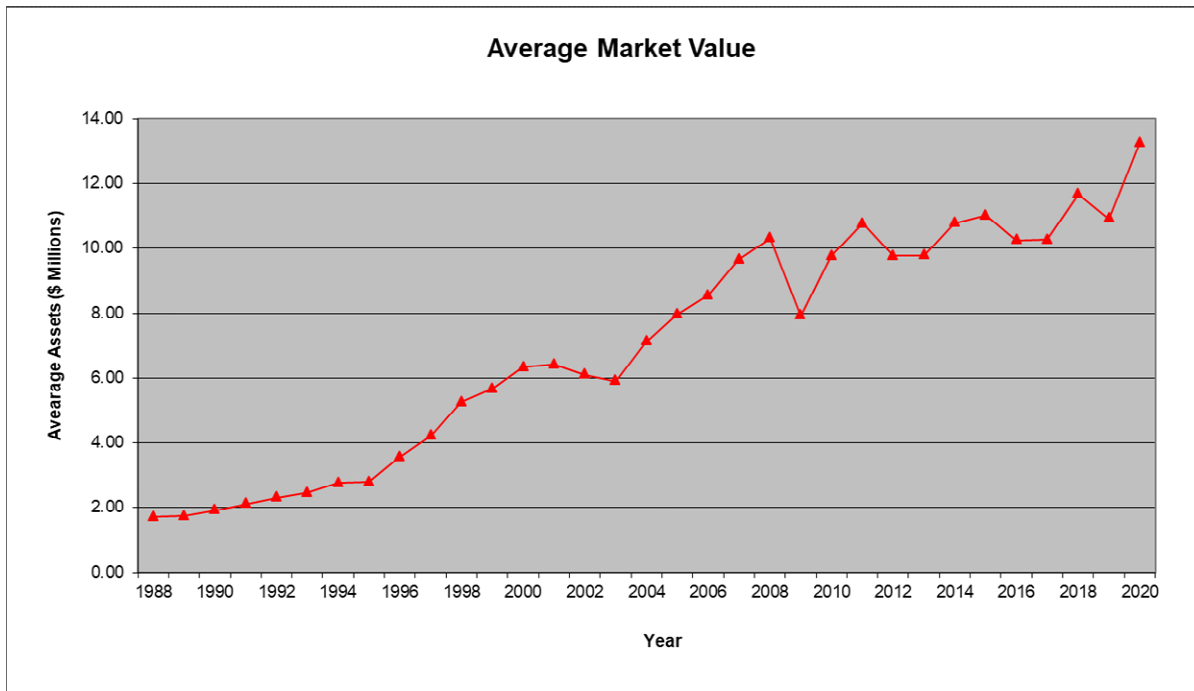
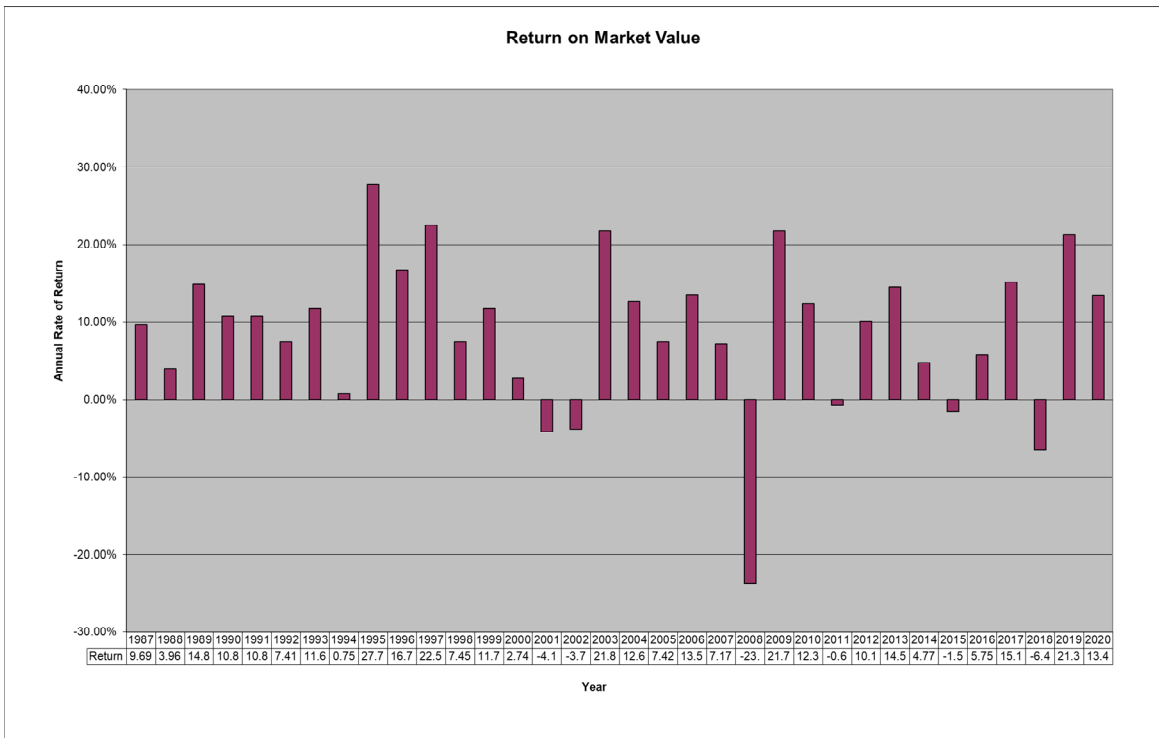
This section shows the change in asset values from last year, the current asset mix, and the actuarial value of assets used for calculating contribution requirements. Assets by category and changes from year to year are shown for the years 2016 through 2020 (Exhibit 1A and 1B).

### INVESTMENT RETURN 1987 TO 2020

Year Ended 31-Dec	Average Asset Value	Investment Return	
		Amount	%
1987	1,567,141	151,856	9.69%
1988	1,719,798	68,104	3.96%
1989	1,749,271	259,242	14.82%
1990-91	1,926,054	443,665	10.86%
1992	2,314,880	171,505	7.41%
1993	2,466,908	288,483	11.69%
1994	2,768,786	20,788	0.75%
1995	2,788,327	774,401	27.77%
1996	3,572,464	598,536	16.75%
1997	4,214,255	950,957	22.57%
1998	5,257,802	391,641	7.45%
1999	5,679,201	664,469	11.70%
2000	6,332,894	173,807	2.74%
2001	6,420,161	(266,836)	-4.16%
2002	6,102,887	(230,864)	-3.78%
2003	5,903,811	1,288,773	21.83%
2004	7,129,777	903,021	12.67%
2005	7,971,622	591,201	7.42%
2006	8,545,382	1,155,080	13.52%
2007	9,663,228	692,935	7.17%
2008	10,314,157	(2,449,327)	-23.75%
2009	7,934,626	1,727,136	21.77%
2010	9,767,185	1,208,155	12.37%
2011	10,771,733	(70,944)	-0.66%
2012	9,770,072	987,550	10.11%
2013	9,779,065	1,421,585	14.54%
2014	10,784,760	514,783	4.77%
2015	11,012,664	(168,789)	-1.53%
2016	10,254,317	590,131	5.75%
2017	10,262,951	1,555,137	15.15%
2018	11,670,721	(756,695)	-6.48%
2019	10,912,476	2,325,922	21.31%
2020	13,245,633	1,778,038	13.42%
Total		17,753,446	
Average investment return for the period			8.28%
(Geometric ave annual compounded rate			



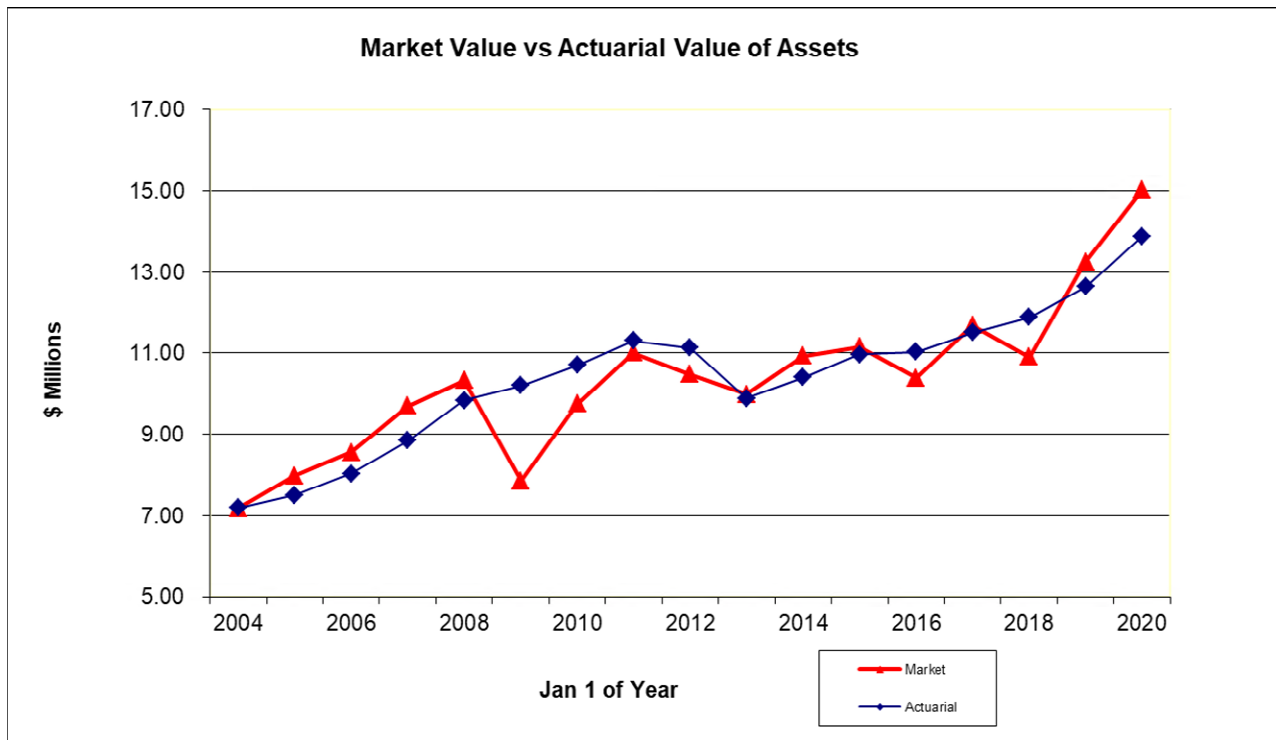
The internal rate of return reflects interest, dividends, realized gains and losses, unrealized appreciation (for market value), and payments. The timing of contributions to the plan (assumed to be uniform throughout the year) has been taken into account in calculating the internal rate of return.



**Actuarial Value of Assets**

In prior years the actuarial value of assets has been equal to the market value reported by the trustee less any benefits payable at year-end. The actuarial value of assets is equal to the market value as reported by the trustee plus any contributions receivable with regard to the completed plan year. Effective for the January 1, 2003 valuation, investment gains or losses relative to the actuarial assumed rate of return were recognized evenly over five years. The result is termed the *smoothed value* of actuarial assets. This method is specifically authorized by the IRS for actuarial valuations of ERISA covered plans and is widely used for public sector plans as well. The actuarial value of assets is determined by separately spreading the gains or losses relative to the actuarial return assumption over 5 years.

See Exhibit 1C for the development of the smoothed value of assets.



**RECONCILIATION OF PLAN ASSETS**  
December 31, 2019 to December 31, 2020

<b>Receipts</b>	2020
Contributions	
Employer	\$ 710,010
Employee	615,342
Interest and Dividends	372,249
Net Realized Appreciation/(Depreciation)	367,925
Total	\$ 2,065,526
 <b>Disbursements</b>	
Benefit Payments	\$ 1,119,185
DROP contribution refunds	0
Return of member contributions	210,733
Expenses	88,258
Total	1,418,176
 <b>Reconciliation</b>	
Market Value as of December 31, prior year	\$ 13,247,915
Excess of Receipts over Disbursements	647,351
Unrealized Appreciation /(Depreciation) during the year	1,126,122
Market Value of Invested Assets as of December 31	\$ 15,021,388
Contributions Receivable	0
Payables	0
<b>Market Value as of December 31</b>	<b>\$ 15,021,388</b>
 <hr/>	
Average return on assets (BAI method)	before expense
	14.14%
	net of expense
	13.42%

**RECONCILIATION OF PLAN ASSETS**  
December 31, 2018 to December 31, 2019

<b>Receipts</b>	2019
Contributions	
Employer	\$ 650,969
Employee	565,707
Interest and Dividends	402,032
Net Realized Appreciation/(Depreciation)	31,764
Total	\$ 1,650,473
 <b>Disbursements</b>	
Benefit Payments	\$ 1,137,653
DROP contribution refunds	0
Return of member contributions	59,989
Expenses	44,110
Total	1,241,752
 <b>Reconciliation</b>	
Market Value as of December 31, prior year	\$ 10,902,958
Excess of Receipts over Disbursements	408,721
Unrealized Appreciation /(Depreciation) during the year	1,936,236
Market Value of Invested Assets as of December 31	\$ 13,247,915
Contributions Receivable	0
Payables	0
<b>Market Value as of December 31</b>	<b>\$ 13,247,915</b>
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Average return on assets (BAI method)	before expense <b>21.76%</b>
	net of expense <b>21.32%</b>

## Exhibit 1A

## SUMMARY OF PLAN ASSETS

As of December 31, 2016 to December 31, 2020

Category	12/31/2020		12/31/2019		12/31/2018		12/31/2017		12/31/2016	
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Cash and Equivalents	\$756	0%	\$16,213	0%	\$148,371	1%	\$391,596	3%	\$286,720	3%
Equities										
Common Stock		0%		0%	5,911,911	54%	7,204,370	62%	6,235,760	60%
Collective Funds	8,742,100	58%	6,964,010	53%		0%		0%		0%
Alternatives	3,053,407	20%	2,080,611	16%	1,198,092	11%	1,150,418	10%	1,053,453	10%
Balanced		0%		0%		0%		0%		0%
Total	\$11,795,507	79%	\$9,044,622	68%	\$7,110,003	65%	\$8,354,788	72%	\$7,289,213	70%
Fixed Income										
Government bond	0	0%	204,467	2%	0	0%	0	0%	0	0%
Collective Funds	3,219,842	21%	3,982,281	30%	3,637,355	33%	2,935,063	25%	2,811,467	27%
Mortgage-related	0	0%	0	0%	0	0%	0	0%	0	0%
Total	\$3,219,842	21%	\$4,186,747	32%	\$3,637,355	33%	\$2,935,063	25%	\$2,811,467	27%
Other - accrued income	5,283	0%	0	0%	7,228	0%	342	0%	11,850	0%
Total Invested Assets	\$15,021,388	100%	\$13,247,582	100%	\$10,902,958	100%	\$11,681,789	100%	\$10,399,250	100%
Contributions Receivable	0		0		0		0		0	
Payables	0		0		0		0		0	
<b>Market Value of Assets</b>	<b>\$10,902,958</b>		<b>\$13,247,582</b>		<b>\$10,902,958</b>		<b>\$11,681,789</b>		<b>\$10,399,250</b>	

## RECONCILIATION OF PLAN ASSETS

December 31, 2015 to December 31, 2020

Receipts	2020		2019		2018		2017		2016	
Contributions										
Employer	\$	710,010	\$	650,969	\$	633,568	\$	488,555		\$519,911
Employee		615,342		565,707		549,091		488,555		519,911
Interest and Dividends		372,249		402,032		325,708		226,518		192,368
Net Realized Appreciation/(Depreciation)		<u>367,925</u>		<u>31,764</u>		<u>1,247,915</u>		<u>833,554</u>		<u>270,547</u>
Total		\$ 2,065,526		\$ 1,650,472.69		\$ 2,756,281		\$ 2,037,182		\$1,502,738
<b>Disbursements</b>										
Benefit Payments		1,119,185		1,137,653		1,193,698		1,249,707		1,930,220
Expenses		<u>88,258</u>		<u>44,110</u>		<u>96,424</u>		<u>100,593</u>		<u>100,928</u>
Total		1,418,176		1,241,752		1,301,219		1,350,300		2,031,149
<b>Reconciliation</b>										
Market Value as of December 31, prior year		\$13,247,915		\$10,902,958		\$11,681,789		\$10,399,250		\$10,699,517
Excess of Receipts over Disbursements		647,351		408,721		1,455,063		686,882		(528,411)
Unrealized Appreciation /(Depr) during the year		<u>1,126,122</u>		<u>1,936,236</u>		<u>(2,233,893)</u>		<u>595,657</u>		<u>228,144</u>
Market Value of Invested Assets December 31		\$15,021,388		\$13,247,915		\$10,902,958		\$11,681,789		\$10,399,250
Contributions Receivable		0		0		0		0		0
Payables		<u>0</u>		<u>0</u>		<u>0</u>		<u>0</u>		<u>0</u>
<b>Market Value as of December 31</b>		<b>\$15,021,388</b>		<b>\$13,247,915</b>		<b>\$10,902,958</b>		<b>\$11,681,789</b>		<b>\$10,399,250</b>
Average return on assets (BAI method)	before expense	14.14%	before expense	21.76%	before expense	-5.68%	before expense	16.21%	before expense	6.77%
	net of expense	13.42%	net of expense	21.32%	net of expense	-6.47%	net of expense	15.16%	net of expense	5.76%

## Exhibit 1C

**DEVELOPMENT OF THE ACTUARIAL VALUE OF ASSETS**

as of January 1, 2021

Market Value as of December 31, 2015	\$10,699,517	
Contributions	1,039,822	
Benefit Payments and Expenses	(2,031,149)	
Expected investment earnings at 8%	809,538	
Expected Market Value as of December 31, 2016	<u>                    </u>	\$10,517,728
Actual Market Value as of December 31, 2016		10,399,250
Investment Loss (Gain) for 2016		\$118,478
Market Value as of December 31, 2016	\$10,399,250	
Contributions	977,110	
Benefit Payments and Expenses	(1,350,300)	
Expected investment earnings at 7.75%	787,120	
Expected Market Value as of December 31, 2017	<u>                    </u>	\$10,813,180
Actual Market Value as of December 31, 2017		11,681,789
Investment Loss (Gain) for 2017		(\$868,609)
Market Value as of December 31, 2017	\$11,681,789	
Contributions	1,182,659	
Benefit Payments and Expenses	(1,301,219)	
Expected investment earnings at 7.75%	896,543	
Expected Market Value as of December 31, 2018	<u>                    </u>	\$12,459,772
Actual Market Value as of December 31, 2018		10,902,958
Investment Loss (Gain) for 2018		\$1,556,814
Market Value as of December 31, 2018	\$10,902,958	
Contributions	1,216,677	
Benefit Payments and Expenses	(1,241,752)	
Expected investment earnings at 7.75%	839,998	
Expected Market Value as of December 31, 2019	<u>                    </u>	\$11,717,880
Actual Market Value as of December 31, 2019		13,247,915
Investment Loss (Gain) for 2019		(\$1,530,035)

Market Value as of December 31, 2019	\$13,247,915	
Contributions	1,325,352	
Benefit Payments and Expenses	(1,418,176)	
Expected investment earnings at 7.75%	1,018,537	
Expected Market Value as of December 31, 2020		\$14,173,628
Actual Market Value as of December 31, 2020		15,021,388
Investment Loss (Gain) for 2020		(\$847,760)

## Actuarial asset method: 5 year phase-in of gains or losses relative to assumed earnings

Year	(Gains) and Losses	Percent Recognized	Percent Deferred	Deferred Amount
2016	\$128,478	100%	0%	\$0
2017	(868,609)	80%	20%	(\$173,722)
2018	1,556,814	60%	40%	\$622,726
2019	(1,530,035)	40%	60%	(\$918,021)
2020	<u>(847,760)</u>	20%	80%	<u>(\$678,208)</u>
Total	(\$1,561,112)			(\$1,147,225)

Marker Value of Assets as of January 1, 2021	\$15,021,388
Actuarial Value of Assets as of January 1, 2021 before receivable	\$13,874,163
Refund Payable	0
Actuarial Value of Assets as of January 1, 2021 with receivable	<b>\$13,874,163</b>
Ratio of Actuarial Value to Market Value	92.36%



## Plan Funding Requirements

The exhibit in this section develops the contribution rate needed to meet the funding policy adopted for the plan. Under the funding policy combined member and city contributions are to be sufficient to meet the cost of current service (the *normal cost*) and to amortize any remaining unfunded actuarial liability over a period of 40 years or less (preferably 15 to 25 years). Amortization is calculated as a percentage of payroll rather than a level dollar basis. Total payroll is assumed to increase at 5% per annum in determining the amortization amount.

Applying this funding standard involves actuarial assumptions and the selection of an actuarial cost method. Five actuarial cost methods are in common use in the United States; the method selected for the Big Spring Firemen's Relief and Retirement Fund Retirement System is the *entry age normal cost method*. See the Actuarial Method and Assumptions section of this report for a description of this cost method. The purpose of a cost method is to assign the long term cost of a retirement program to specific periods of time.

### Actuarial Value of Assets

Effective with the 1-1-2003 valuation the actuarial value of assets was developed using 5-year smoothing. Under this method investment gains and losses relative to the actuarial rate of return (8%) are spread uniformly over 5 years. Actuarial assets relative to the actuarial assumed rate were initialized by separately amortizing the gains or losses for each of the prior 5 years. See Exhibit 1C of the prior section.

### Required Contributions

Exhibit 2 shows the development of the unfunded actuarial liability and amortization period for the years beginning with 2000, using the actuarial assumptions in effect for such valuations. The actuarial valuation as of January 1, 2013 reflects the increase in member contribution rate from 12% to 13% of pay, and inclusion of overtime pay within limits (2011 amendment). The January 1, 2015 actuarial valuation reflects the increase in the City contribution from 12% of pay to 13% of pay. The 2017 actuarial valuation (after agreed upon plan changes) reflects the increase in City contributions to 15% of pay and certain other changes. There were no changes plan provisions from the prior (2019) valuation.

Actuarial assumptions were changed in 2019 to adopt the recently published mortality table for public safety employees as recommended by Actuarial Standards of Practice No. 35. The mortality for this table is projected for mortality improvement using the MP-2020 projection. The 2019 valuation used the same basic mortality assumption with the MP2018 projection table. See Exhibit 2A.

The current contribution rate of 13% of pay from the members and 15% of pay from the City is sufficient to meet the accruing normal cost of the plan and to amortize the unfunded actuarial liability by level percentage of pay contributions over a period of **33.69** years.

## Recommendations

The most recent (6/30/2017) actuarial funding standards published by the State of Texas Pension Review Board states:

*“An actuarially funded defined benefit public retirement system is considered actuarially sound if an actuary determines that it has sufficient money to pay the ongoing normal cost and amortize the unfunded liability over a period of no more than 30 years, preferably 15 to 25 years... Benefit increases should not be adopted if all plan changes being considered cause a material increase in the amortization period and if the resulting amortization period exceeds 25 years.”*

The remaining amortization period on the valuation date was **33.69** years. The measured funding level of the plan is outside the recommended 30 year maximum limits of the PRB guidelines by a small margin. The decrease in the amortization period from 2019 is primarily due to investment results but also includes demographic effects.

The Pension Review Board Guidelines includes four other recommended standards.

1. The funding of a pension plan should reflect all plan obligations and assets. (This actuarial valuation reflects all obligations and assets, with smoothing adjustment.)
2. The allocation of the normal cost portion of the contributions should be level or declining as a percent of payroll over all generation of taxpayers, and should be calculated under applicable actuarial standards. (The *entry age normal cost method* used in the valuation meets this standard.)
3. Funding of the unfunded actuarial accrued liability should be level or declining as a percent of payroll over the amortization period. (The adopted amortization method meets this standard.)
4. The choice of assumptions should be reasonable, and should comply with applicable actuarial standards. (We believe the actuarial assumptions to be within the range of reasonable assumptions and to be consistent with Actuarial Standards of Practice.)

Note that the actuarial assumptions do not include any inherent margins. Pay increases, turnover, and retirement rate assumptions are based on Texas firefighter experience. Mortality is a best estimate with projected future mortality improvement. The other assumptions are investment return and inflation

Also recognizing the deferred investment losses that are included in the actuarial value of assets (smoothed assets), ***we recommend no changes in plan design that increase the long term cost of the Plan until the funded level of the plan improves. The current provisions of the plan and PRB recommendations also impose a limit on plan improvements.***

Note that adding future hires to the plan will be helpful because the combined contribution for them is greater than the normal cost and thus can be used to pay interest and principal on the unfunded actuarial liability.

**Key Funding Terms**

**Normal Cost Contribution** The *entry age normal cost method* is used to develop the normal cost contribution for the plan. Under this cost method the normal cost is calculated as the level percentage of pay sufficient to fund all benefits if contributed from hire to termination or retirement.

**Unfunded Actuarial Liability** The unfunded actuarial liability is the excess of the total accrued liability over the actuarial value of assets. The total accrued liability is an amount equal to the theoretical accumulation of normal costs from the earliest plan entry date until the valuation date for all participants in the plan.

## Exhibit 2A

## Impact of Assumption Change on Contribution Requirements

## Pro Forma for 2021 Plan Year

Total Contribution Rate	28%	28%	
Interest Rate/ Pay Increases	7.75%/4.5%	7.75%/4.5%	Percent
Mortality:	Pub2010PS + MP-2018	Pub2010PS + MP-2020	Change
Actuarial liability (entry age normal method)			
Retired, survivors and deferred vested	\$ 13,809,954	\$ 13,745,988	-0.5%
Active employees	11,634,196	11,624,447	-0.1%
Total	\$ 25,444,150	\$ 25,370,435	
Assets	13,874,163	13,874,163	
Unfunded Actuarial Liability	\$ 11,569,988	\$ 11,496,272	-0.6%
Annual amount to amortize the unfunded actuarial liability over 30 years from 1-1-92	\$ 2,457,863	\$ 2,442,203	-0.6%
Annual normal cost	748,738	748,432	0.0%
Administrative expenses	50,000	50,000	
One half year's interest	121,937	121,330	
Total annual contribution	\$ 3,378,538	\$ 3,361,965	-0.5%
Valuation payroll as of January 1	\$ 4,501,839	\$ 4,501,839	
<b>Amortization years for current contribution lev</b>	<b>34.10</b>	<b>33.69</b>	(0.4)
Required contribution rate for 30 year	\$ 1,364,240	\$ 1,360,281	-0.3%
Rolling amortization from valuation date			
Percent of payroll	30.30%	30.22%	
	16.63%	16.63%	

As a measure of the long term cost of the plan we also present the entry age normal cost as a % of pay

## Exhibit 2B

## Development of Plan Contribution Requirements

Plan Year	2006	2008	2010	2012	2013	2015	2017	2019	2021
Plan Change:		<i>Hi-5 Pay</i>	<i>Hi-5 Pay</i>	<i>Hi-5 Pay</i>	<i>Hi-5 Pay</i>	<i>Hi-5 Pay</i>	<i>City: 15%</i>		
Assets:	<i>Smoothed</i>	<i>Smoothed</i>	<i>Smoothed</i>	<i>Smoothed</i>	<i>Smoothed</i>	<i>Smoothed</i>	<i>Smoothed</i>	<i>Smoothed</i>	<i>Smoothed</i>
Mortality:	<u>UP94p2000</u>	<u>RP2000p</u>	<u>RP2000p</u>	<u>RP2000p</u>	<u>RP2000p</u>	<u>RP2000p</u>	<u>RP2000p</u>	<u>Pub2010PS</u>	<u>Pub2010PS</u>
Actuarial liability (entry age normal method)									
Retired, survivors and deferred vested	\$ 5,269,225	\$ 9,031,611	\$ 11,133,227	\$ 13,582,614	\$ 13,008,308	\$ 13,700,489	\$ 12,970,022	\$ 12,596,845	\$ 13,745,988
Active employees	<u>6,337,421</u>	<u>5,408,880</u>	<u>4,935,371</u>	<u>4,565,758</u>	<u>4,425,604</u>	<u>6,295,944</u>	<u>7,534,488</u>	<u>9,717,607</u>	<u>11,624,447</u>
Total	\$ 11,606,646	\$ 14,440,491	\$ 16,068,598	\$ 18,148,372	\$ 17,433,912	\$ 19,996,433	\$ 20,504,510	\$ 22,314,452	\$ 25,370,435
Assets	<u>8,029,457</u>	<u>9,837,578</u>	<u>10,699,811</u>	<u>11,133,176</u>	<u>9,889,540</u>	<u>10,962,120</u>	<u>11,033,641</u>	<u>11,874,904</u>	<u>13,874,163</u>
Unfunded Actuarial Liability	\$ 3,577,189	\$ 4,602,913	\$ 5,368,787	\$ 7,015,196	\$ 7,544,372	\$ 9,034,313	\$ 9,470,869	\$ 10,439,548	\$ 11,496,272
Annual amount to amortize the unfunded actuarial liability over 30 years from 1-1-92	\$ 273,857	\$ 352,383	\$ 519,916	\$ 793,732	\$ 853,606	\$ 1,243,717	\$ 2,021,596	\$ 2,217,718	\$ 2,442,203
Annual normal cost	315,207	350,627	404,266	393,571	354,312	453,334	545,439	696,787	748,432
Administrative expenses	10,000	40,000	40,000	50,000	50,000	50,000	50,000	50,000	50,000
One half year's interest	<u>17,679</u>	<u>27,579</u>	<u>36,256</u>	<u>46,579</u>	<u>47,387</u>	<u>66,576</u>	<u>97,617</u>	<u>110,830</u>	<u>121,330</u>
Total annual cost	\$ 622,174	\$ 770,589	\$ 1,000,437	\$ 1,283,882	\$ 1,305,305	\$ 1,813,627	\$ 2,714,652	\$ 3,075,335	\$ 3,361,965
Valuation payroll as of January 1	\$ 2,219,825	\$ 2,760,912	\$ 3,312,629	\$ 3,356,918	\$ 3,173,050	\$ 3,634,001	\$ 3,766,262	\$ 4,259,859	\$ 4,501,839
Required total contribution for 30 year fixed period from 1-1-92 as a percent of payroll	28.03%	27.91%	30.20%	38.25%	41.14%	49.91%	72.08%	72.19%	74.68%
Amortization years for current contribution level	32.26	25.66	22.06	27.00	30.85	28.65	27.56	38.33	<b>33.69</b>
Required contribution rate for 30 year Rolling amortization from valuation date	\$ 518,581	\$ 637,292	\$ 731,789	\$ 813,985	\$ 799,962	\$ 934,058	\$ 1,033,358	\$ 1,256,795	\$ 1,360,281
Percent of payroll	23.36%	23.08%	22.09%	24.25%	25.21%	25.70%	27.44%	29.50%	30.22%

## **GASB-25 Disclosure Information**

### **GASB-25 Disclosures**

GASB-25 requires disclosure of the plan's funding progress on an actuarial basis and a comparison of actual employer contributions with those required under the funding policy adopted for the plan. Additional disclosures are required under GASB 27 if the contributions to the plan are less than the annual required contributions under the funding policy of the plan.

GASB 25 and 27 were superseded by GASB 67 effective for the 2014 plan year. A separate actuarial report is prepared for the GASB 67 and 68 disclosure requirements. Certain GASB 25 disclosures are continued in this report to maintain a plan financial history.

A key measurement is the Actuarial Accrued Liability (AAL). One of several possible actuarial cost methods may be selected for determining the Actuarial Accrued Liability. In the case of the Big Spring Firemen's Relief and Retirement Fund Employees' Retirement System, the actuarial cost method is the same as used for determining the contribution requirements of the plan, namely the entry age normal cost method.

Exhibit 3 presents the schedule of funding progress for the plan.

Actual and required employer contributions to the plan are considered to be equal or sufficiently close under the funding policy adopted for the plan (30 year level percentage of pay amortization or less) so the provisions of GASB 27 are met without additional expense accrual requirements. The investment performance and demographic experience of the plan should be closely monitored, preferably by annual actuarial valuations of the plan.

Exhibit 4 summarizes the actuarial method and assumptions used in the last nine actuarial valuations of the plan.

## Exhibit 3

## SCHEDULE OF FUNDING PROGRESS

<u>Actuarial Valuation Date</u>	<u>Actuarial Value of Assets</u>	<u>Actuarial Accrued Liability (AAL)</u>	<u>Unfunded AAL (UAAL)</u>	<u>Funded Ratio</u>	<u>Covered Payroll</u>	<u>UAAL as a Percentage of Covered Payroll</u>
1/1/1994	2,753,155 *	4,374,799	1,621,644	62.9%	1,201,032	135.0%
1/1/1997	4,197,613 *	5,485,602	1,287,989	76.5%	1,710,009	75.3%
1/1/2000	6,355,356 *	7,814,776	1,459,420	81.3%	1,654,359	88.2%
1/1/2003	6,853,922 **	9,588,552	2,734,630	71.5%	2,086,466	131.1%
1/1/2006	8,029,825 **	11,606,646	3,576,821	69.2%	2,219,825	161.1%
1/1/2008	9,837,578 **	14,585,360	4,747,782	67.4%	2,760,912	172.0%
1/1/2010	10,699,811 **	16,068,598	5,368,787	66.6%	3,312,629	162.1%
1/1/2012	11,133,176 **	18,148,372	7,015,196	61.3%	3,356,918	209.0%
1/1/2013	9,889,540 **	17,433,912	7,544,372	56.7%	3,173,050	237.8%
1/1/2015	10,962,120 **	19,996,433	9,034,313	54.8%	3,634,001	248.6%
1/1/2017	11,033,641 **	20,504,510	9,470,869	53.8%	3,766,262	251.5%
1/1/2019	11,874,904 **	22,314,452	10,439,548	53.2%	4,259,859	245.1%
1/1/2021	13,874,163 **	25,370,435	11,496,272	54.7%	4,501,839	255.4%

\* Market value

\*\* 5-year actuarial smoothed value

Exhibit 4  
**SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS**

Valuation date	1/1/2006	1/1/2008	1/1/2010	1/1/2012 to 1/1/2015	1/1/2017	1/1/2019 to 1/1/2021
<b>Actuarial cost method</b>	Entry age	Entry age	Entry age	Entry age	Entry age	Entry age
<b>Amortization method</b>	Level percent of payroll	Level percent of payroll	Level percent of payroll	Level percent of payroll	Level percent of payroll	Level percent of payroll
<b>Remaining amortization period</b>	30 years	30 years	30 years	30 years	30 years	30 years
<b>Asset valuation method</b>	5 year actuarial asset smoothing	5 year actuarial asset smoothing	5 year actuarial asset smoothing	5 year actuarial asset smoothing	5 year actuarial asset	5 year actuarial asset smoothing
<b>Actuarial assumptions</b>						
Interest rate	8%	8%	8%	8%	7.75%	7.75%
Pay increases	5%*	5%*	5%*	5%*	4.5%*	4.5%*
Mortality	UP1994p2000	RP 2000 fully projected	RP 2000 fully projected	RP 2000 fully projected	RP 2000 fully projected	Pub2010 Public Safety MP-2018/2020 projection
Retirement rates	Age 52 with 20 years	Age 52 with 20 years	Age 52 with 20 years	Age 52 with 20 years	Age 52 with 20 years	Age 52 with 20 years
Turnover	Graded by age and service	Graded by age and service	Graded by age and service	Graded by age and service	Graded by age and service	Graded by age and service

\* With additional increases for the first 10 years of service

Note that the Pension Review Board Guidelines recommend a maximum amortization period of 40 years with 15 to 25 years being preferable. The plan has historically used a 30 year standard.



## Participant Census Data

This section summarizes the census data used in the actuarial valuation and provides plan membership statistics. The exhibits in this section present the following information:

Summary of active participants by age and service groupings.  
Includes counts and average pay by age

Retired participants by age with average pension and average age

We maintain a database of participant information for the Big Spring Firemen's Relief and Retirement Fund which is available to you for ad hoc queries and special reports.

### SUMMARY OF ACTIVE EMPLOYEES FOR LAST 14 VALUATIONS

Dec 31 of	Number	Ave Age	Ave Service	Ave Salary	Percentage increase
1989	46	36.1	9.1	21,704	
1991	46	37.8	11.0	22,037	0.8%
1993	51	37.8	11.1	23,550	3.4%
1996	66	35.5	9.2	25,909	3.2%
1999	56	36.8	11.0	29,542	4.5%
2002	61	36.0	10.5	34,204	3.7%
2005	57	37.3	10.6	38,944	4.4%
2007	54	34.4	8.1	43,382	5.5%
2009	55	33.3	7.3	47,951	10.5%
2011	52	33.1	6.8	48,893	2.0%
2013	52	32.6	6.4	48,340	(1.1)%
2015	59	32.5	6.5	55,445	14.7%
2017	63	33.0	6.8	59,254	6.9%
2019	64	34.9	8.3	65,786	11.0%
2021	65	36.1	9.13	69,259	5.3%

**AGE AND SERVICE OF ACTIVE PARTICIPANTS**

1/1/2021

Age Group	Years of Service												All Service	
	0 - 4		5 - 9		10 - 14		15 - 19		20 - 24		25 - 29		Count	Ave Pay
	Count	Ave Pay	Count	Ave Pay	Count	Ave Pay	Count	Ave Pay	Count	Ave Pay	Count	Ave Pay	Count	Ave Pay
20 - 24	5	42,307	1	57,007	0		0		0		0		6	44,757
25 - 29	5	53,866	4	66,069	0		0		0		0		9	59,290
30 - 34	8	38,923	9	66,914	2	86,532	0		0		0		19	57,194
35 - 39	3	57,901	8	62,543	2	91,828	1	102,961	0		0		14	68,619
40 - 44	0		1	55,244	1	73,874	0		2	106,862	0		4	85,710
45 - 49	0		0		2	84,304	3	102,965	5	90,634	2	105,983	12	95,220
50 - 54	0		0		0		0		0		0		0	
55 - 59	0		0		0		0		0		0		0	
60 - 64	0		0		0		0		0		0		0	
65 - 69	0		0		0		1	53,126	0		0		1	53,126
<b>Totals</b>	<b>21</b>		<b>23</b>		<b>7</b>		<b>5</b>		<b>7</b>		<b>2</b>		<b>65</b>	

Age is in completed years (age last birthday) on the census date.

Service is completed years of credited service on the census date.

Pay is the considered compensation for the preceding plan year.

**SUMMARY OF NONACTIVE PARTICIPANTS**

January 1, 2021

Age Group	Males			Females			Total		
	Count	Benefit	Weighted Ave Age	Count	Benefit	Weighted Ave Age	Count	Benefit	Weighted Ave Age
<b>Retired Participants in Payment Status</b>									
50 - 54	2	1,541,814	52.23				2	1,541,814	52.23
55 - 59	6	221,872	57.99				6	221,872	57.99
60 - 64	8	305,224	62.56				8	305,224	62.56
65 - 69	9	288,807	66.80				9	288,807	66.80
70 - 74	7	140,782	72.20				7	140,782	72.20
75 - 79	1	19,689	77.23				1	19,689	77.23
80 - 84	1	14,863	82.46				1	14,863	82.46
85 - 89									
90 - 110									
110									
<b>Totals</b>	<b>34</b>	<b>2,533,052</b>	<b>57.12</b>	<b>0</b>	<b>0</b>		<b>34</b>	<b>2,533,052</b>	<b>57.12</b>
<b>Ave amount</b>		<b>74,501.52</b>			<b>0.00</b>			<b>74,501.52</b>	
<b>Survivors in Payment Status</b>									
55 - 59									
60 - 64									
65 - 69				2	31,807	67.32	2	31,807	67.32
70 - 74									
75 - 79				3	46,887	77.55	3	46,887	77.55
80 - 84				1	9,608	82.29	1	9,608	82.29
85 - 89									
90 - 110									
<b>Totals</b>	<b>0</b>	<b>0</b>		<b>6</b>	<b>88,302</b>	<b>74.38</b>	<b>6</b>	<b>88,302</b>	<b>74.38</b>
<b>Ave amount</b>		<b>0.00</b>			<b>14,717.04</b>			<b>14,717.04</b>	
<b>Disabled Participants</b>									
50 - 54									
55 - 59									
60 - 64									
65 - 69	1	4,842	68.79				1	4,842	68.79
70 - 74									
75 - 79									
80 - 84	1	14,820	80.29				1	14,820	80.29
85 - 89									
90 - 110									
<b>Totals</b>	<b>2</b>	<b>19,662</b>	<b>77.46</b>	<b>0</b>	<b>0</b>		<b>2</b>	<b>19,662</b>	<b>77.46</b>
<b>Ave amount</b>		<b>9,831.00</b>			<b>0.00</b>			<b>9,831.00</b>	
<b>Deferred Vested Former Employees</b>									
30 - 39									
40 - 49	1	10,500	49.02				1	10,500	49.02
50 - 54									
<b>Totals</b>	<b>1</b>	<b>10,500</b>	<b>49.02</b>	<b>0</b>	<b>0</b>		<b>1</b>	<b>10,500</b>	<b>49.02</b>
<b>Ave amount</b>		<b>10,500.48</b>			<b>0.00</b>			<b>10,500.48</b>	
<b>Grand Totals</b>	<b>37</b>	<b>2,563,214</b>	<b>57.25</b>	<b>6</b>	<b>88,302</b>	<b>74.38</b>	<b>43</b>	<b>2,651,517</b>	<b>57.82</b>
<b>Ave amount</b>		<b>69,276.06</b>			<b>14,717.04</b>			<b>61,663.17</b>	

## Actuarial Method and Assumptions

This report assumes the plan will exist as an ongoing entity. All numbers presented are based on this ongoing plan concept with costs and liabilities determined under the projected unit credit actuarial cost method.

### Entry Age Normal Cost Method

Under the entry age normal cost method, the normal cost is computed as the level percentage of pay amount which, if paid from the time each employee became a participant until his assumed retirement, would accumulate with interest at the assumed valuation rate to a fund sufficient to pay his retirement benefits

Experience gains (decreases in cost due to favorable experience), or experience losses (increases in cost due to adverse experience), attributable to deviations between the assumed and actual experience of the Plan, are reflected as increases or decreases in the unfunded actuarial liability and, through the amortization amount, the contribution required for the plan.

### Valuation of Liabilities

All active participants included in the valuation are assumed to earn one full year of credited service for each year of future participation. In addition, members are assumed to have 6 months of additional service credit at retirement from accrued sick leave, vacation, and compensatory time.

Costs for ancillary benefits provided by the System have been determined in the same manner and on the same basis as costs for normal retirement benefits.

The valuation payroll is equal to annualized 2020 pay, including the pay of DROP employees (none as of January 1, 2021).

### Valuation of Assets

The actuarial value of assets is equal to 5 year smoothing of investment experience gains or losses relative to the long term assumed rate of return (7.75%). The gain or loss for any particular year relative to the assumed long term return is recognized evenly over 5 years.

## Summary of Actuarial Assumptions

<b>Interest Rate</b>	7.75% per annum
<b>Pay Increases</b>	4.5% per year plus additional percentages for the first 10 years of service
<b>Retirement Rates</b>	Upon the attainment of age 52 or, if later, 20 years of service
<b>Mortality</b>	PUB2010 Public Safety fully projected for cohort mortality improvement with scale MP2020 (appropriate versions of this table for employees, annuitants and disabled individuals)
<b>Disability</b>	Rates by age as shown below
<b>Turnover</b>	Rates by age and years of service as shown below
<b>Percent Married</b>	90%
<b>Administration Expense</b>	\$50,000 per annum

Additional turnover rates for first five years of service (added to attained age rates)

<u>Year</u>	<u>Rate/thousand</u>
1	50
2	40
3	30
4	20
5	10

Additional pay increases for the first ten years of service (added to basic 4.5% assumed pay increases)

<u>Year</u>	<u>Additional Percentage</u>	<u>Year</u>	<u>Additional Percentage</u>
1	5.0%	6	2.5%
2	4.5	7	2.0
3	4.0	8	1.5
4	3.5	9	1.0
5	3.0	10	0.5

**SUMMARY OF ACTUARIAL ASSUMPTIONS**

Interest Rates		Age	Rates per Thousand					
			Mortality		Turnover	Disability	Retirement	
			Male	Female				
<b>Purpose</b>	<b>Rate</b>							
<b>before retirement</b>	7.75%	20	0.410	0.130	173.86	0.60	0	
after retirement	7.75%	21	0.410	0.130	167.66	0.66	0	
		22	0.400	0.120	161.90	0.71	0	
<b>Mortality Tables</b>		23	0.390	0.120	156.57	0.76	0	
Not in pay status	Pub2010PS employee	24	0.380	0.110	151.71	0.81	0	
Healthy annuitants	Pub2010PS annuitant	25	0.370	0.120	146.99	0.85	0	
Disabled annuitants	Pub2010PS disabled	26	0.380	0.130	142.51	0.90	0	
<i>Mortality rates are projected by scale MP-2020</i>		27	0.390	0.140	137.97	0.95	0	
		28	0.400	0.160	133.51	1.00	0	
<b>Pay Increase Assumption</b>		29	0.410	0.170	129.19	1.05	0	
Annual rates of pay increase		30	0.410	0.190	125.01	1.10	0	
as shown		31	0.420	0.210	121.00	1.16	0	
		32	0.430	0.220	117.16	1.22	0	
<b>Turnover</b>		33	0.440	0.250	103.48	1.30	0	
Age-related rates as shown		34	0.450	0.270	89.95	1.38	0	
		35	0.470	0.300	76.56	1.47	0	
<b>Retirement Age</b>		36	0.490	0.320	63.31	1.58	0	
Rates of retirement as shown		37	0.500	0.360	50.18	1.71	0	
Rates are only applied if the employee is eligible to retire.		38	0.530	0.390	47.15	1.85	0	
		39	0.560	0.430	44.22	2.01	0	
		40	0.590	0.470	41.38	2.20	0	
<b>Form of payment</b>		41	0.620	0.510	38.58	2.42	0	
mandatory cashouts	Lump sum	42	0.670	0.550	35.81	2.66	0	
other benefits	Normal form	43	0.710	0.600	33.05	2.93	0	
		44	0.760	0.660	30.30	3.24	0	
<b>Other Assumptions</b>		45	0.820	0.720	27.54	3.60	0	
Percent married	90%	46	0.880	0.780	24.79	3.99	0	
Husband/wife age differ	3	47	0.950	0.840	22.01	4.43	0	
		48	1.020	0.910	19.22	4.92	0	
Increase in Social Security		49	1.110	0.990	16.39	5.46	0	
Wage Base	3.00%	50	1.200	1.070	13.53	6.06	0	
		51	1.290	1.150	10.61	6.72	0	
		52	1.400	1.240	7.64	7.45	1000	
		53	1.510	1.340	4.59	8.25	1000	
		54	1.620	1.450	1.67	9.13	1000	
		55	1.750	1.570	0.00	10.09	1000	

## Risk Assessment

In measuring pension obligations and determining plan contributions, assumptions about future events need be made. Actuarial assumptions are set according to best estimates of future events. These assumptions are reviewed periodically for continued relevance, and are adjusted where appropriate to reflect changing circumstances or additional insights.

Because the future is unknown, there is risk that future measurements will deviate from expectations if actual experience differs from that assumed. Specific risks that could affect the financial condition of the plan in the future include:

### Investment Risk

Pension plans have a long investment horizon, and the assumed return is intended to reflect a long-term view. However, if the actual long-term return turns out to be less (or more) than assumed, plan obligations will be higher (or lower) than calculated, and plan costs will tend to increase (or decrease) over time. For example, if the long-term rate were only 6.75% (rather than the 7.75% assumed), the calculated liability would be **12.6%** higher.

Because assets are invested for the long term, the return on plan assets will vary from year to year. The expectation is that lower-than-expected returns in down years will be offset by higher-than-expected returns in good years, and the long-term funding of the plan will not be adversely affected. However, this volatility in return will cause contribution requirements to vary from year to year.

The ratio of plan assets to covered payroll is a good measure of how sensitive the contribution rate is to fluctuating investment return. For most governmental plans, this ratio is between 1.50 and 4.50. The ratio for this plan as of 1/1/2021 is: **3.34**.

As a rule of thumb, if the investment return in a given single year is 1% lower (or higher) than the assumed 7.75% rate, the contribution rate will increase (or decrease) by 0.09% of pay, times the plan's asset-to-payroll ratio – so, for this plan, **0.30% of payroll**.

Through the development of the actuarial value of assets, this rate change is phased in over 5 years. To the extent that investment gains and losses offset each other over a 5-year period, the contribution rate volatility may be dampened.

### Demographic Risk

Demographic assumptions are also intended to reflect the long-term characteristics of the plan population, and they also are subject to year-by-year volatility. While there is no simple rule of thumb regarding demographic experience, there are general things to keep in mind:

- Demographic effects on small plan populations cause greater volatility than on large plan populations. One more employee than expected terminating employment will have a larger impact on a workforce of 50 employees, than on a workforce of 500 employees.

- Favorable and unfavorable experience among different employees offset each other to some extent. However, infrequent events affecting the workforce as a whole (such as an across-the-board pay scale adjustment, or a large-scale layoff) will amplify the impact on plan funding.
- The amortization amount (or surplus credit) is calculated as a dollar amount based on cumulative past experience. A significant change in total covered payroll (which could result from a noticeable difference in the number of active participants on the valuation date) could cause this dollar amount to represent a substantial difference when expressed as a percentage of pay.

### **Contribution Risk**

Governmental pension plans are typically funded either on an *actuarial required contribution* (ARC) basis or a *specified contribution* basis with amortization period monitoring. The Texas FRRF plans have historically used the second approach.

#### *Actuarial Required Contribution Funding*

The municipality is the plan sponsor and has actuarial valuations to determine the percentage of pay needed to meet the adopted funding standard. The employer contribution rates may change up or down each year. The contribution risk in this case is that the plan sponsor chooses not to make the annual actuarial required contribution for some period. This can degrade the funding of the plan and in the worst case lead to unmet plan liabilities. Contributing less than the recommended amount will of necessity require larger contributions in the future.

In developing a contribution policy that balances out the various objectives of predictability, minimal volatility, and intergenerational equity, it is assumed that the municipality consistently makes the recommended contributions. Contributing less than the recommended amount will of necessity require larger contributions in the future.

Consistently underfunding the plan can cause the contribution rate to spiral out of control, seriously jeopardizing the plan's funded status and the benefit security of its employees and retirees.

#### *Specified Contribution Funding*

Under this approach as used in Texas FRRF plans the member contributions and City contribution are both specified as plan provisions as are the benefit payable to participants. The contribution rates and benefits are initially set to an actuarial balance with a targeted amortization period for the unfunded actuarial liability.

As plan experience unfolds, both demographic and investment returns, the amortization period may increase or decrease from the initial target. It is the responsibility of the City and the members to adjust benefit levels for current and/or future participants or to adjust the contribution rates if the experience of the plan is less favorable than the actuarial assumptions. The Pension Review Board has specific recommendation for Texas public retirement plans about the range of recommended amortization periods and changes that might be needed in the plan provisions or funding.



### Certification

This report presents the actuarial position of the Big Spring Firemen's Relief and Retirement Fund as of January 1, 2021, in accordance with generally accepted actuarial principles applied on a basis consistent with that of the preceding valuation.

Plan provisions were for this valuation unchanged from the 2019 valuation. The historical figures presented for 2017 are the amounts after allowing for plan and actuarial assumption changes approved for 2018. Plan provisions have not changed since these 2018 amendment.

Actuarial assumptions were updated for this valuation by changing the mortality projection assumption from the MP2018 table used in the 2019 valuation to the mostly recently available projection table (MP2020). There was no change in the basic mortality assumption or other actuarial assumptions.

The valuation results in this report are based on participant and financial data provided by the Board of Trustees of the plan.

In our opinion, each assumption used in combination to calculate liabilities and costs represents our best estimate of anticipated experience under the plan and is reasonably related to the plan experience and to reasonable expectations. However, the most appropriate assumption for different purposes may vary and use of the values in this report for purposes other than those stated should be avoid or discussed with the actuary.

DEAN ACTUARIES, LLC



8/9/2021  
Date

Charles E. Dean, FSA, FCA  
Enrolled Actuary 20-01249

8/9/2021  
Date



Sean M. Sullivan, FSA  
Enrolled Actuary 20-03649