Laredo Firefighters Retirement System

Actuarial Valuation
as of September 30, 2018

May 23, 2019

Rudd and Wisdom, Inc.
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May 23, 2019

Board of Trustees
Laredo Firefighters Retirement System
Post Office Box 3069
Laredo, Texas 78044

Members of the Board of Trustees:

At the request of the Board of Trustees of the Laredo Firefighters Retirement System, we have prepared this report of the results of the actuarial valuation of the system as of September 30, 2018. This valuation was prepared to determine whether the system has an adequate contribution arrangement.

In a separate report dated February 4, 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 September 30, 2018. Similarly, we provided a separate report dated December 20, 2018 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, 2018. GASB 68 prescribes the city's accounting for your system, while this actuarial valuation report reflects the assumed continuation of the current funding policy.

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

Sincerely,

Mark R. Fenlaw

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Rebecca B. Morris

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Section I

Valuation Summary

An actuarial valuation of the assets and liabilities of the Laredo Firefighters Retirement System as of September 30, 2018 has been completed. The valuation was based on the Present Plan (plan effective January 1, 2019) and the provisions of the Texas Local Fire Fighters' Retirement Act (TLFFRA) which were in effect on September 30, 2018. Section II shows the summary of key results of the actuarial valuation as of September 30, 2018 and discusses the significant changes since the prior valuation that we prepared as of September 30, 2016.

This valuation reflects an actuarially assumed total contribution rate of 36.10%, comprised of 15.00% by the firefighters and 21.10% by the city. The total contribution rate of 36.10% exceeds the normal cost rate of 20.90%, leaving 15.20% available to amortize the unfunded actuarial accrued liability (UAAL) of $104,273,436. 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 43 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 Pension Review Board guidelines for pension funding, 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 current maximum acceptable period. The PRB guidelines will be changing to a maximum of 30 years allowing for phase in through 2025. Since the total contributions are not 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 inadequate contribution arrangement. Section III presents considerations for restoring an adequate contribution arrangement.**

Projected Actuarial Valuation Results

In addition to completing this actuarial valuation, we estimated the amortization periods as of September 30, 2020 and as of September 30, 2022 by making projections from the September 30, 2018 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 (losses in 2015 and 2018 and gains in 2016 and 2017) that have been only partially recognized as of September 30, 2018. As shown in Exhibit 6, 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 2015-2018 that the system experienced. The AVA used in this valuation is $155,509,979. The market value of assets (MVA) is $154,813,837. The $696,142 difference between the MVA and the AVA is the net of the deferred gains and losses over the past four years 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 market value of assets, as seen in Exhibit 7.

For the purpose of projecting the amortization period through 2022 we used six scenarios of various assumed annual rates of investment return, net of investment-related expenses, over the 2019-2022 projection period. The projected amortization periods will not be the same as the actual amortization periods from completed future actuarial valuations but are the result of projected future actuarial valuation results based on the completed September 30, 2018 actuarial valuation. 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 September 30, 2018, and (2) of investment returns over the next four years different from the 7.5% assumption used in this valuation.

	Scenario					
	1	2	3	4	5	6
Assumed Investment Return for Fiscal Year						
2018-2019	7.5%	11.0%	4.0%	0.0%	4.0%	0.0%
2019-2020	7.5	11.0	15.0	16.5	4.0	4.0
2020-2021	7.5	11.0	15.0	16.5	4.0	4.0
2021-2022	7.5	11.0	15.0	16.5	4.0	4.0
2022-2023 and later	7.5	7.5	7.5	7.5	7.5	7.5
Amortization Period in Years as of September 30:						
2018 (actual)	43.0	43.0	43.0	43.0	43.0	43.0
2020 (projected)	42.1	38.1	42.2	45.4	46.9	51.4
2022 (projected)	39.2	28.1	28.8	28.7	60.1	85.8

The projected future September 30, 2022 valuation in Scenario 1 reveals that the amortization period is projected to decrease very close to the expected 4-year reduction to 39.2. This is the result of the relatively small deferred net gains and losses that the system has as of September 30, 2018. The primary conclusion from Scenario 1 is that

unless there are some significant investment gains in the next four years from returns greater than 7.5%, the amortization period will stay near 40 years in the next two valuations.

One of the characteristics of a plan like yours with a high amortization period is that it is relatively more sensitive to investment losses than to investment gains, despite their gradual recognition over five years. For example, Scenario 2 has four years of 11% returns, and Scenario 5 has four years of 4% returns. The two sets of returns are 3.5% either side of the 7.5% investment return assumption. Yet four years later, the projected amortization period in Scenario 2 is only 11.1 years less than in Scenario 1 (28.1 years vs. 39.2 years) while the projected amortization period for Scenario 5 is 20.9 years more than in Scenario 1 (60.1 years vs. 39.2 years).

We do not know what the investment experience will be for each of the next four fiscal years. However, these scenarios show both the sensitivity of the UAAL amortization period when it is over 40 years as well as the challenge of reducing the amortization period with favorable investment experience. 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 contributions.

The primary conclusion from the scenarios is that it is very unlikely that the system would grow its way in the next four years through very favorable investment experience to an amortization period of under 30 years. The board and the system members should consider the recommended changes in the plan provisions or increases in contribution rates described in Section III that would strengthen the system for the long-term future.

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, Mr. Jaime Jasso. We have not audited the data provided but have reviewed it for reasonableness and consistency relative to the data provided for the September 30, 2016 actuarial valuation. Exhibit 1 is a distribution of the active firefighters by age and service. The salaries used for projecting future contributions and benefits in the valuation were based on the actual pay for the 2017-2018 fiscal year, adjusted to fully reflect the 1.5% general pay increase effective in October 2018. The total of these salaries is our assumed annualized covered payroll for the fiscal year beginning October 1, 2018 and is used in the valuation to determine the UAAL amortization period. The averages of the assumed salaries for the 2018-2019 fiscal 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 September 30, 2018. Exhibit 2A is a reconciliation of firefighters and pensioners from September 30, 2016 to September 30, 2018. Exhibit 3 shows a breakdown of the dollar amount of the monthly benefits for retirees and surviving spouses. Exhibit 4 shows a historical comparison of the actuarial accrued liability and the actuarial value of assets.

The summary of assets contained in Exhibit 5 is based on the September 30, 2018 market value of assets contained in the information received from the board. This exhibit also shows a comparison with the market values and actuarial values of assets as of September 30, 2016 and September 30, 2018. Exhibit 5A contains the statement of changes in assets for fiscal years ending September 30, 2018 and September 30, 2017. Exhibit 6 shows the development of the actuarial value of assets. Exhibit 7 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 September 30, 2016 and September 30, 2018 is shown in Exhibit 8.

Assumptions

As a part of each actuarial valuation, we review the actuarial assumptions used in the prior actuarial valuation. As a result of our review and discussion with the board of trustees and of the decision by the board of trustees at your May 15 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. 7.5% annual investment return (interest rate) net of investment-related expenses;
2. 2.75% annual general compensation increase plus an average of 1.89% per year for promotion, step, and longevity increases over a 30-year career;
3. Retirement rates which result in an average expected age at retirement of 53.5;
4. PubS-2010 (safety employees) total dataset mortality tables projected for mortality improvement using scale MP-2018; and
5. City contribution rate of 21.10% over the UAAL amortization period.

The following actuarial assumption changes have been made, and the new assumptions are compared to those used in the September 30, 2016 valuation:

1. The annual investment return assumption was changed from 7.9% to 7.5% net of investment-related expenses. We also modified the components of the assumption, increasing the assumed net real rate of return from 4.65% to 4.75% and lowering the assumed inflation rate from 3.25% to 2.75%.

2. We changed the general compensation increase from 3.25% per year to 2.75%, making it the same as the revised underlying price inflation assumption. As a result, we also changed the aggregate payroll increase assumption from 3.25% per year to 2.75%. We think that reducing the long-term rate of inflation is appropriate. See our review of the inflation assumption in Appendix A.

3. The mortality assumption was changed from the RP-2000 Combined Healthy Mortality Tables projected to 2024 with Scale AA to the PubS-2010 (safety employees) total dataset mortality tables for employees and for retirees, projected for mortality improvement generationally using the projection scale MP-2018. The rationale for the change is to use the results of a new, first-ever study of the mortality of public employee pension plan participants by the Society of Actuaries. The new mortality assumption is more appropriate for the system for the long-term future than the prior assumption.

4. The actuarial cost method was refined by using a normal cost as a percentage of payroll that reflects that contributions to the system are made biweekly.

The effects of these changes in assumptions 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 9 and 10. 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, and their selection complies with the applicable actuarial standards of practice.

Plan Provisions

After the September 30, 2016 actuarial valuation, the board authorized a number of special studies that resulted in two packages of amendments that were approved by the firefighters and the board in September 2017. The changes included these:

- The basis of the final average salary was changed from the 78 highest biweekly pay periods to the 78 consecutive highest.
- The pay included in determining the final average salary was changed from including lump sums for certain pay for unused sick leave and vacation to excluding all lump sums for unused sick leave and vacation.
- The total benefit multiplier of years of service times 3.03% was modified by adding a maximum of 93.93%.
- The monthly death benefit for surviving children was increased from $300 to $1,360.
- The lump sum death benefit for retirees and spouses was increased from $8,750 to $12,000.

These changes were incorporated into the provisions of the Present Plan (plan effective January 1, 2019) are reflected in this September 30, 2018 actuarial valuation. They also were reflected in the revised September 30, 2016 actuarial valuation. The net effect of these changes was to reduce the UAAL by $5.2 million and to reduce the UAAL amortization period by 6.2 years, from 34.2 years in the original 2016 valuation to 28.0 years in the revised valuation. Then in September 2018 some additional changes were made effective January 1, 2019 which did not affect the revised September 30, 2016 actuarial valuation. Those changes dealt with recovery from disability and the process for future increases in benefits. Exhibit 12 summarizes the plan provisions of the Present Plan.

Actuarially Determined Contributions by the City

GASB 68 is all about accounting for pensions and did away with the concept of annually required contributions, referred to as the ARC. The GASB made a point of separating their accounting standard for public employee defined benefit plans from the actual funding of those plans. In other words, the city's GASB 68 pension expense will usually be very different from its actual contributions. That is why separate reports are needed each year to provide the required GASB 68 actuarial information.

As a result of GASB getting out of the business of providing a funding standard, the PRB recommended in their report to the Texas Legislature at the end of 2014 that actuarial valuation reports for fixed contribution rate plans should disclose contribution levels required for a variety of appropriate amortization periods. Since the preferred range for the UAAL amortization period is 10 to 25 years in the PRB's pension funding guidelines and since the PRB's new maximum amortization period is 30 years, we have shown the city contribution rate that would be required beginning October 1, 2019 for amortization periods of 20, 25 and 30 years based on this September 30, 2018 actuarial valuation.

UAAL Amortization Period	Actuarially Determined Contribution Rate by the City	Firefighter Contribution Rate	Total Contribution Rate
20 Years	28.27%	15.00%	43.27%
25 Years	25.37%	15.00%	40.37%
30 Years	23.55%	15.00%	38.55%

In 2015, the Legislature passed HB 3310 which amended Sections 801 and 802 of the Government Code. It included a new sentence in Section 802.101(a) which requires an actuarial valuation to include a recommended rate needed to have an amortization period for the UAAL that does not exceed 30 years. According to the current collective bargaining agreement (CBA), the city is increasing its contribution rate each October in 0.25% increments until it is 21.1% in October 2021. Since our assumed continuation of this funding

policy results in an actuarially determined amortization period of 43 years, we must recommend a different funding policy that would increase the city's contribution rate. For an amortization period of 30 years, we recommend a city contribution rate of 23.55% effective October 1, 2019.

Variability in Future Actuarial Measurement

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as: 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 is typically outside the scope of an actuarial valuation for funding purposes. However, we provided projected amortization periods for the next two biennial actuarial valuations under six scenarios. 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.

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Section II

Key Results of the Actuarial Valuation

	September 30, 2016[1]	September 30, 2018
1. Actuarial present value of future benefits		
a. Those now receiving benefits or former firefighters entitled to receive benefits	$ 92,941,885	$ 109,859,367
b. Firefighters	201,893,706	229,578,565
c. Total	$ 294,835,591	$ 339,437,932
2. Actuarial present value of future normal cost contributions	$ 72,853,290	$ 79,654,517
3. Actuarial accrued liability (Item 1c – Item 2)	$ 221,982,301	$ 259,783,415
4. Actuarial value of assets	$ 134,249,115	$ 155,509,979
5. Unfunded actuarial accrued liability (UAAL) (Item 3 - Item 4)	$ 87,733,186	$ 104,273,436
6. Contributions (percent of pay)		
a. Firefighters	15.00%	15.00%
b. City of Laredo	20.10%	21.10%
c. Total	35.10%	36.10%
7. Normal cost (percent of payroll)	19.26%	20.90%
8. Percent of payroll available to amortize the UAAL (Item 6c - Item 7)	15.84%	15.20%
9. Annualized covered payroll	$ 35,063,139	$ 36,904,234
10. Present annual amount available to amortize the UAAL (Item 8 x Item 9)	$ 5,554,001	$ 5,609,444
11. Years to amortize the UAAL	28.0 years	43.0 years[3]
12. Funded ratio (Item 4 ÷ Item 3)[2]	60.5%	59.9%

[1] All items are based on the revised September 30, 2016 actuarial valuation and reflect the Present Plan.

[2] The funded ratio is not appropriate for assessing either the need for or the amount of future contributions or the adequacy of the assumed contribution rates. Using the market value of assets instead of the actuarial value of assets for Item 12 would have resulted in funded ratios of 56.9% as of September 30, 2016 and 59.6% as of September 30, 2018. **The best indicator of the system's health is item 11.**

[3] Calculated reflecting the timing of the increases in the city contribution rate each October in 0.25% increments from 20.35% in October 2018 until it is 21.10% in October 2021.

Change in Amortization Period

The amortization period, based on the Present Plan provisions, was determined in the revised actuarial valuation as of September 30, 2016 to be 28.0 years. Since two years have passed since that valuation date, a 26.0-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 methods had been made. The amortization period is now 43.0 years based on the same plan provisions. The actual experience occurring between September 30, 2016 and September 30, 2018 differed from the expected experience, and in combination with the changes in assumptions, the resulting amortization period was 43.0 years, which is 17.0 years more than the expected 26.0-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 fiscal years 2017 and 2018 was 9.4%. 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 fiscal years 2017 and 2018 was 6.4%, less than the assumed rate of return for those years of 7.9%. This resulted in an **increase** in the amortization period of 2.5 years.

2. The aggregate payroll increased at an average rate of 2.6% per year instead of the assumed 3.25% per year rate, which caused the amortization period to **increase** by 0.7 of a 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 3.1 years. This was primarily the result of somewhat lower-than-expected pay increases.

4. The change in the general compensation increase and aggregate payroll increase assumptions from 3.25% to 2.75% and the decrease in the annual investment return assumption from 7.9% to 7.5% had the combined net effect of **increasing** the amortization period by 12.9 years.

5. The result of the change in the mortality assumption resulted in an **increase** in the amortization period of 4.5 years.

6. The increase in the city contribution rate in 0.25% increments from 20.1% to 21.1% by October 2021 had the effect of **decreasing** the amortization period by 2.5 years.

7. The change in the actuarial cost method to reflect biweekly contributions in the determination of the normal cost as a percent of payroll had the effect of **increasing** the amortization period by 2.0 years.

Contribution Rate for the Death Benefit Fund

The 2005 firefighter election and board approval established a Death Benefit Fund effective July 1, 2005. This fund is a separate account within the system used to pay lump sum death benefits. The Death Benefit Fund is funded by a portion of the city's total contribution rate. As a part of the revised September 30, 2016 actuarial valuation, the city contribution needed for the Death Benefit Fund was determined to be 0.28% of payroll. As a part of this September 30, 2018 actuarial valuation, the city contribution needed for the Death Benefit Fund has been determined also to be 0.28% of payroll. We recommend the continuation of this rate effective October 1, 2019, which is the beginning of the next plan year, for the next two plan years.

The remainder of the city's contribution will be used for the system's liabilities excluding the lump sum death benefits. The 0.28% city contribution rate is comprised of the normal cost percentage plus an additional amount to amortize the unfunded actuarial accrued liability (UAAL) for only the lump sum death benefits over 16 years as shown below. The amortization of this UAAL is determined as a level percentage of payroll assuming that the payroll will increase 2.75% per year.

Allocated City Contribution Effective October 1, 2019 for the Death Benefit Fund	
Normal cost	0.06%
16-year amortization of unfunded actuarial accrued liability	0.22
Total city contribution rate allocated to the Death Benefit Fund as of October 1, 2019	0.28%

The 0.28% city contribution rate was determined using the same actuarial cost method and actuarial assumptions used in the September 30, 2018 actuarial valuation for the system. In particular, the entry age actuarial cost method was used with the normal cost determined as a level percentage of payroll. The following is a summary of the actuarial valuation results of the liabilities for the lump sum death benefits.

Actuarial Valuation Results of the Death Benefit Fund as of September 30, 2018	
1. Actuarial present value of future benefits	
a. Current retired members and spouses	$ 875,358
b. Current active members	531,784
c. Total	$ 1,407,142
2. Actuarial present value of future normal cost contributions	$ 214,311
3. Actuarial accrued liability (Item 1c – Item 2)	$ 1,192,831
4. Assets of fund	$ 266,092
5. Unfunded actuarial accrued liability (Item 3 – Item 4)	$ 926,739

Section III

Restoring an Adequate Contribution Arrangement

The results of this actuarial valuation as of September 30, 2018 reveal that the system, based on the Present Plan of benefits and the current contribution rates, has an inadequate contribution arrangement. There are three options for restoring an adequate contribution arrangement: (1) a sufficient increase in the total contribution rate, (2) a package of sufficient decreases in benefits, or (3) a sufficient combination of increases in contributions and decreases in benefits.

Section I of this report included the effect of three different increases in the city's contribution rate. For example, an increase from the scheduled 20.60% to 23.55% beginning October 1, 2019 would result in an amortization period of 30 years. This 2.95% increase would be sufficient for restoring an adequate contribution rate for the long-term future. Alternatively, a city contribution rate of 22.6% and a firefighter contribution rate of 16%, both beginning October 1, 2019, would result in an amortization period of 30 years. We recommend either one of these alternatives that would result in an amortization period of 30 years.

If it is too much of a challenge to increase the total contribution rate by 3% by October 1, 2019, the board may want to consider combining contribution rate increases with some decreases in benefits. Changes in benefit eligibility and reductions in future benefit accruals are painful, but here are some examples of options:

- Increase the earliest retirement age from 50 to 52, and increase the minimum age and service requirement for the DROP benefit calculation date from age 51 and 21 years of service to age 53 and 23 years of service.
- Reduce the benefit formula multiplier from 3.03% per year of service to 2.9% per year of service.
- Increase the period for determining the Final Average Monthly Salary from 78 biweekly pay periods to 130 periods.

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

Exhibit 1

Distribution of Firefighters by Age and Service on September 30, 2018 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	26	13	4	0	0	0	0	0	0	43	53,300
2	0	0	0	0	0	0	0	0	0	0	0
3	7	17	3	3	0	0	0	0	0	30	67,136
4	2	7	4	1	0	0	0	0	0	14	80,498
5	0	0	0	0	0	0	0	0	0	0	0
6	0	17	11	2	0	0	0	0	0	30	81,657
7	0	10	20	8	0	1	0	0	0	39	82,789
8	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0
10	0	1	11	4	1	1	0	0	0	18	86,858
11	0	0	6	8	1	0	0	0	0	15	90,129
12	0	0	0	0	0	0	0	0	0	0	0
13	0	0	5	10	5	1	0	0	0	21	95,296
14	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	26	25	8	1	0	0	60	90,319
17	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	1	6	5	0	0	0	12	98,596
19	0	0	0	0	14	9	2	0	0	25	103,913
20-24	0	0	0	1	15	33	7	3	0	59	110,627
25-29	0	0	0	0	0	29	12	1	1	43	117,072
30-34	0	0	0	0	0	0	1	0	0	1	115,063
35+	0	0	0	0	0	0	0	0	0	0	0
Totals	35	65	64	64	67	87	23	4	1	410	$ 90,010

Average Salary	$57,676	$81,162	$99,424	$114,012	$123,912	
	$72,453	$88,783	$107,560	$101,573	$90,010	

Average age	37.4
Average years of service	13.3
Average age at hire	24.1

Exhibit 2

Summary of Pensioner Data

Type of Benefit	Pensioner Data Used in September 30, 2018 Valuation	
	Number of Recipients	Total Monthly Benefit Payments
Service Retirement*	122	$ 722,220
Disability Retirement	4	10,384
Vested Terminated	0	0
Surviving Spouse	29	71,165
Surviving Child	3	2,010
Total	158	$ 805,779

Type of Benefit	Comparison of Pensioner Count by Type as of The Prior and Current Actuarial Valuations			
	September 30, 2016	New	Ceased	September 30, 2018
Service Retirement*	110	+15	-3	122
Disability Retirement	4	0	0	4
Vested Terminated	0	0	0	0
Surviving Spouse	31	+2	-4	29
Surviving Child	3	0	0	3
Total	148	+17	-7	158

* Alternate payees are not included in the number of recipients, but the total monthly payments reflect the total benefits including the payments made to alternate payees.

Exhibit 2A

Firefighter and Pensioner Reconciliation

	Firefighters	Current Payment Status	Vested Terminated Firefighters	Total
1. As of September 30, 2016	388	148	0	536
2. Change of status				
a. retirement	(15)	15	0	0
b. disability	0	0	0	0
c. death	(1)	(7)	0	(8)
d. survivor payment begins	0	2	0	2
e. withdrawal	(5)	0	0	(5)
f. vested termination	0	0	0	0
g. completion of payment	0	0	0	0
h. QDRO alternate payee*	0	0	0	0
i. net changes	(21)	10	0	(11)
3. New firefighters	43	0	0	43
4. As of September 30, 2018	410	158	0	568

* Alternate payees are not included in the number of pensioners in current payment status, but the total monthly payments reflect the total benefits, including the payments made to the alternate payees.

Exhibit 3

Breakdown of Pensioners by Monthly Benefit Amounts as of September 30, 2018

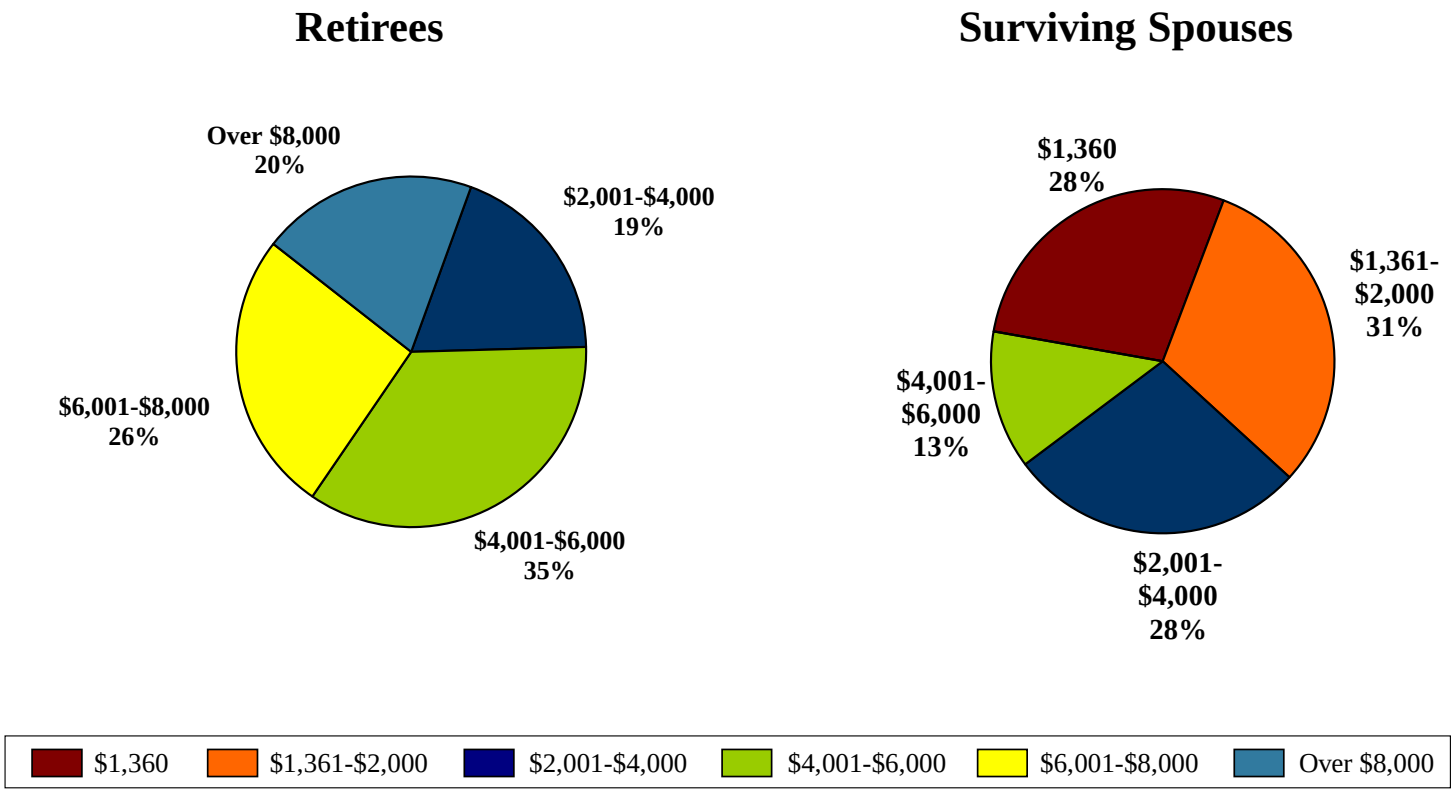

Exhibit 4

Historical Comparison of Actuarial Accrued Liability and Actuarial Value of Assets
(Valuation as of March 31, 2010; as of September 30 beginning in 2012)

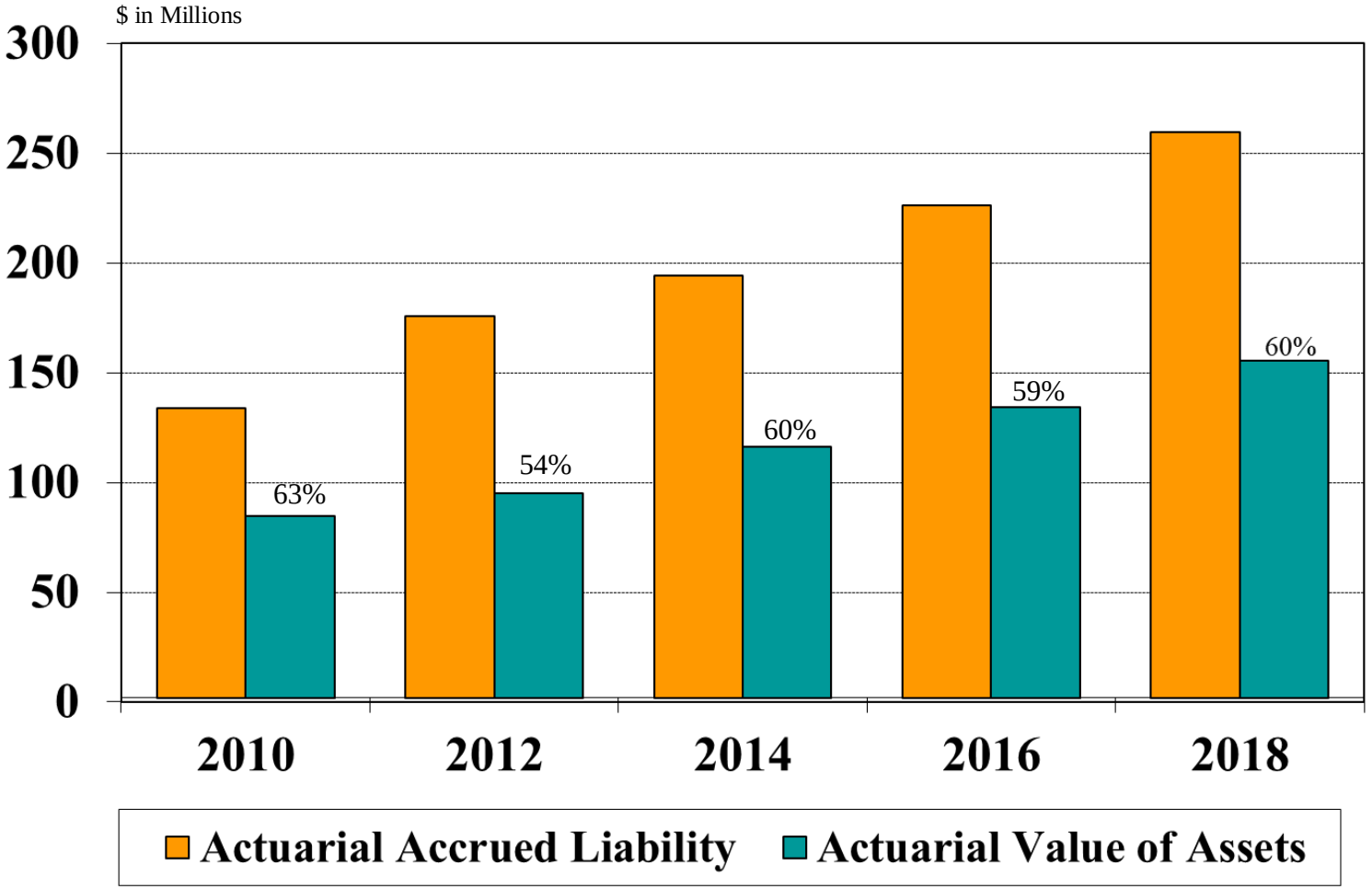

Exhibit 5

Summary of Asset Data[1]

Asset Type	Market Value of Assets as of September 30, 2018	Allocation as a Percent of Grand Total
Equities		
Large Cap	$ 23,866,981	15.42%
Mid Cap	13,710,100	8.85
Small Cap	16,811,712	10.86
International Developed	17,689,955	11.43
International Emerging	14,659,771	9.47
Total	86,738,519	56.03
Fixed Income		
Core	22,375,727	14.45
TIPS	7,306,247	4.72
Total	29,681,974	19.17
Alternatives		
Hedge Funds	22,554,359	14.57
Real Estate (REIT)	7,355,432	4.75
Natural Resources	7,806,562	5.04
Total	37,716,353	24.36
Cash and Equivalents	676,991	0.44
Grand Total	$ 154,813,837	100.00%

Comparison of Asset Values as of the Prior and Current Actuarial Valuation Dates		
	September 30, 2016	September 30, 2018
Market Value	$ 126,305,204	$ 154,813,837
Actuarial Value	$ 134,249,115	$ 155,509,979
Actuarial Value as a Percent of Market Value	106.3%	100.4%

[1] The market value of assets for each asset class except cash was from the investment consultant's report as of September 30, 2018. The grand total was from the audited financial report. The amount of cash was the balancing item.

Exhibit 5A

Statement of Changes in Audited Assets for the Years Ended September 30, 2018 and 2017

	9/30/2018	9/30/2017
Additions		
1. Contributions		
a. Employer	$ 7,264,588	$ 6,845,693
b. Employees	5,416,147	5,109,297
c. Total	$ 12,680,735	$ 11,954,990
2. Investment Income		
a. Interest and dividends	$ 2,418,263	$ 1,940,899
b. Net appreciation in fair value	8,912,941	12,675,138
c. Total	$ 11,331,204	$ 14,616,037
3. Other Additions	2,461	1,440
Total Additions	**$ 24,014,400**	**$ 26,572,467**
Deductions		
4. Benefit Payments	$ 10,471,721	$ 10,165,487
5. Expenses		
a. Direct investment-related	$ 439,717	$ 417,965
b. General administrative	272,399	310,945
c. Total	$ 712,116	$ 728,910
Total Deductions	**$ 11,183,837**	**$ 10,894,397**
Net Increase in Assets	**$ 12,830,563**	**$ 15,678,070**
Market Value of Assets (Plan Net Position)		
Beginning of Year	$141,983,274	$126,305,204
End of Year	$154,813,837	$141,983,274
Rate of Return		
Net of All Expenses	7.42%	10.92%
Net of Investment-Related Expenses	7.62%	11.18%
Gross	7.94%	11.52%
Direct Investment-Related Expenses	0.32%	0.35%

Exhibit 6

Laredo Firefighters Retirement System
Development of Actuarial Value of Assets

Calculation of Actuarial Investment Gain/(Loss) Based on Market Value for Plan Years Ending September 30				
	2018	2017	2016	2015
1. Market Value of Assets as of Beginning of Year	$141,983,274	$126,305,204	$114,438,391	$118,339,638
2. Firefighter Contributions	5,416,147	5,109,297	5,075,400	4,642,722
3. City Contributions	7,264,588	6,845,693	6,801,034	6,221,242
4. Benefit Payments and Administrative Expenses[1]	(10,744,120)	(10,476,432)	(9,550,253)	(9,335,695)
5. Expected Investment Return[2]	11,293,175	10,036,514	9,248,119	9,528,302
6. Expected Market Value of Assets as of End of Year	155,213,064	137,820,276	126,012,691	129,396,209
7. Actual Market Value of Assets as of End of Year	154,813,837	141,983,274	126,305,204	114,438,391
8. Actuarial Investment Gain/(Loss)	$ (399,227)	$ 4,162,998	$ 292,513	$ (14,957,818)
9. Market Value Rate of Return Net of Expenses	7.62%	11.18%	8.25%	(4.56)%
10. Rate of Actuarial Investment Gain/(Loss)	(0.28)%	3.28%	0.25%	(12.56)%

[1] Administrative expenses are included for all years because the investment return assumption was net of investment-related expenses.
[2] Assuming uniform distribution of contributions and payments during the plan year. In 2016 and 2015, the investment return assumption was 8%, and in 2018 and 2017, it was 7.9%.

Plan Year	Investment Gain/(Loss)	Deferral Percentage	Deferred Gain/(Loss) as of 9/30/2018
2018	$ (399,227)	80%	$ (319,382)
2017	4,162,998	60%	2,497,799
2016	292,513	40%	117,005
2015	(14,957,818)	20%	(2,991,564)
Total			$ (696,142)

Actuarial Value of Assets as of September 30, 2018	
11. Market Value of Assets as of September 30, 2018	$ 154,813,837
12. Deferred Gain/(Loss) to be Recognized in Future	(696,142)
13. Preliminary Value (Item 11 – Item 12)	$ 155,509,979
14. Corridor for Actuarial Value of Assets	
a. 90% of Market Value as of September 30, 2018 (minimum)	$ 139,332,453
b. 110% of Market Value as of September 30, 2018 (maximum)	$ 170,295,221
15. Actuarial Value as of September 30, 2018	$ 155,509,979
16. Write Up/(Down) of Assets (Item 15 – Item 11)	$ 696,142

Exhibit 7

Historical Comparison of Market and Actuarial Value of Assets
(Valuation as of March 31, 2010; as of September 30 beginning in 2012)

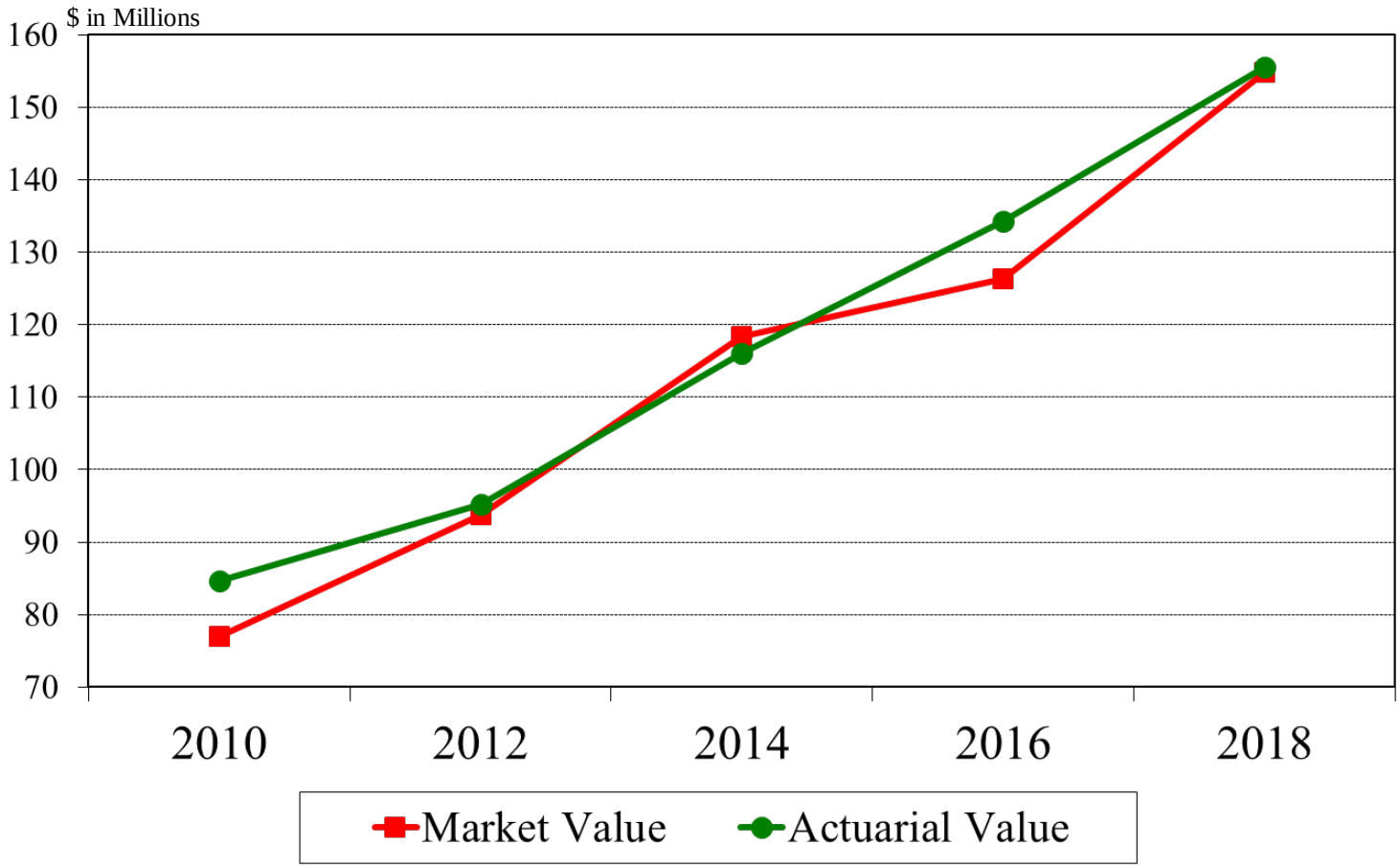

Exhibit 8

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

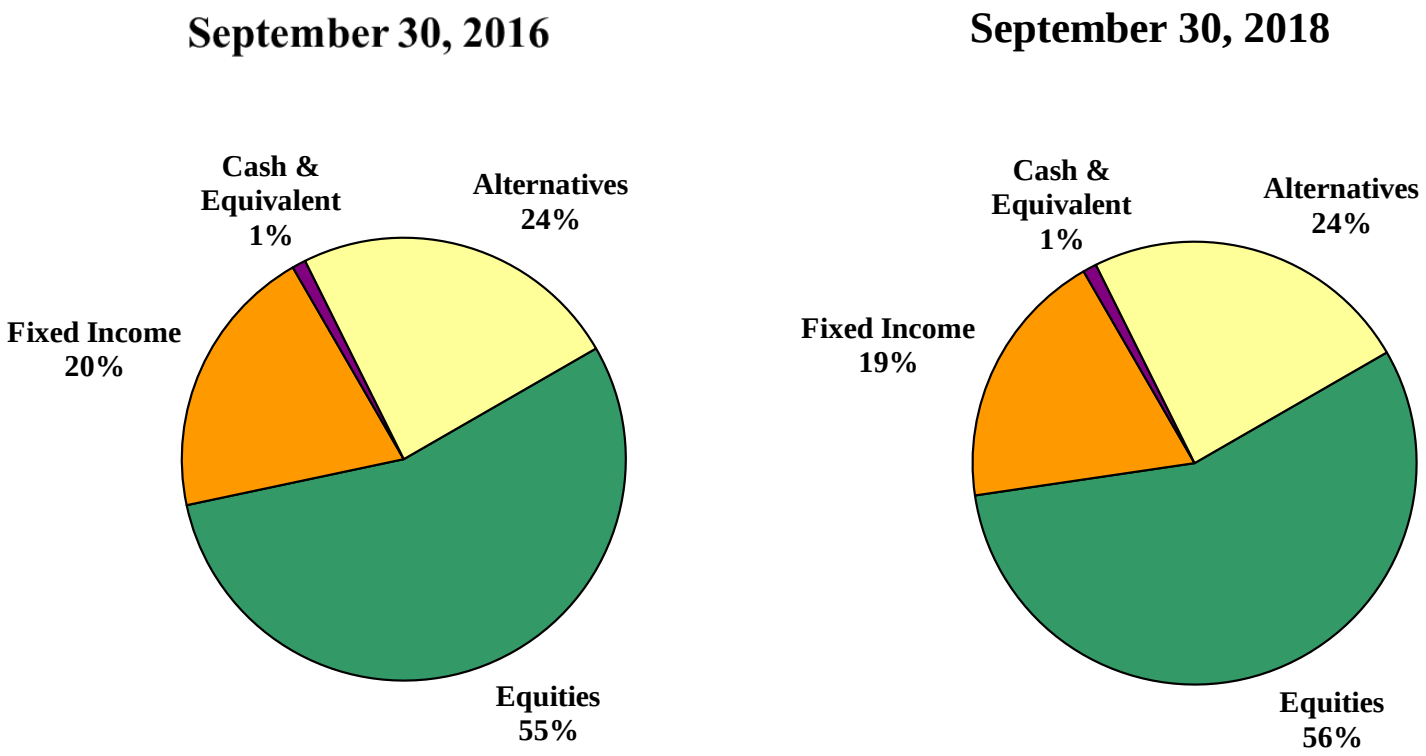

Exhibit 9

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 between age at hire and assumed termination. 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 system 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 system'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 90% of market value nor greater than 110% of market value. See Exhibit 6.

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 and recommend 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 and used actuarial assumptions we consider to be reasonable and appropriate estimates of future experience for the system for the long-term future.

1. Investment Return

   7.5% 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 (safety employees) total dataset mortality tables for employees and for retirees, projected for mortality improvement generationally using the projection scale MP-2018.

4. Compensation Increases

   General increases of 2.75% per year in addition promotion, step, and longevity increases that average 1.89% per year over a 30-year career. See Exhibit 10.

5. Retirement Rates

Age	Rate per Year for Firefighters Eligible to Retire
50-52	15%
53	25
54-57	35
58-59	31
60	100

The average expected retirement age for firefighters under age 50 based on these rates is 53.5.

6. RETRO DROP Election

a. Percent of firefighters eligible electing RETRO DROP: 90% 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 24 months.

7. Withdrawal Rates

See Exhibit 10.

8. Disability Rates

See Exhibit 10. The on-duty and off-duty rates are each 50% of the total rate at each age.

9. Reduction in Benefit after 2½ Years of Disability Retirement

45% weighted average reduction in benefit.

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 four years younger and female firefighters having a spouse four years older.

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

    - Joint and 2/3 to surviving spouse for the 85% assumed to be married
    - Life annuity for the 15% assumed to be single

    To the extent optional forms of payment are 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 very small and will be recognized through the valuation process for those retiring since the prior valuation who made an optional election.

12. Surviving Child's Death Benefit

    None are assumed as a result of future deaths.

13. Firefighters' Contribution Rate

    15.00% of covered pay.

14. City's Assumed Contribution Rate

    21.10% of covered payroll over the UAAL amortization period, after increasing each October in 0.25% increments from 20.35% in October 2018 until it is 21.10% in October 2021.

15. Covered Payroll for First Year Following Valuation Date

    Actual (or annualized) pay for plan year ending September 30, 2018 with adjustment for each firefighter to reflect the 1.5% pay increase effective in October 2018.

16. General Administrative Expenses

    The expenses paid by system assets for other than investment-related expenses are assumed to be 0.75% of payroll. The normal cost rate as a percent of payroll is assumed to be 0.75% of payroll higher to reflect these expenses.

Exhibit 10

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

Disability Rates[1]		Withdrawal 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	18	1	9.94%
21	0.15	1	16	2	9.94
22	0.16	2	14	3	9.94
23	0.17	3	13	4	9.94
24	0.18	4	11	5	9.94
25	0.19	5	9	6	5.83
26	0.21	6	8	7	5.83
27	0.23	7	7	8	5.83
28	0.25	8	6	9	5.83
29	0.28	9	6	10	5.83
30	0.31	10	5	11	4.29
31	0.35	11	4	12	4.29
32	0.40	12	4	13	4.29
33	0.45	13	3	14	4.29
34	0.49	14	3	15	4.29
35	0.52	15	3	16	2.75
36	0.54	16	3	17	2.75
37	0.57	17	2	18	2.75
38	0.62	18	2	19	2.75
39	0.73	19	2	20	2.75
40	0.92	20 & Over	0	21	2.75
41	1.14			22	2.75
42	1.32			23	2.75
43	1.48			24	2.75
44	1.73			25	2.75
45	2.09			26	2.75
46	2.55			27	2.75
47	2.98			28	2.75
48	3.34			29	2.75
49	3.62			30	2.75
50	3.79			31	2.75
51	3.92			32	2.75
52	4.04			33	2.75
53	4.24			34	2.75
54	4.56			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

[1] The on-duty and off-duty rates are each 50% of the total rate shown at each age.

Exhibit 11

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 October 1 and ending September 30.
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, but it does not have to coincide.
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 12

Summary of Present Plan

1. Service Retirement and Duty-Related Disability Retirement Monthly Benefit as a Percentage of Final Average Monthly Salary for Each Year of Service (20-year minimum for disability retirements), subject to a maximum benefit multiplier of 93.93% — 3.03%

2. Off-Duty Disability Retirement Benefit is equal to the Duty-Related Disability Retirement Benefit multiplied by 8% for each year of service as of the date of employment termination (100% maximum). If the disability arose out of service with another employer, no monthly benefit will be payable.

3. Normal Service Retirement Eligibility — Age 50 and 20 Years

4. RETRO DROP
   - (a) Earliest RETRO DROP benefit calculation date — Age 51 and 21 Years
   - (b) Maximum RETRO DROP Benefit Accumulation Period — 24 Months
   - (c) Earliest employment termination date with maximum RETRO DROP accumulation period — Age 53 and 23 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

5. Early Service Retirement
   - (a) Eligibility — Age 45 and 20 Years
   - (b) Reduction in Benefit — Actuarially Equivalent

6. Early Service Retirement Benefit
   - (a) Equal to a percentage of the normal service retirement benefit
   - (b) Percentage based on age and calculated to make the early retirement benefit actuarially equivalent to unreduced benefit starting at age 50

7. Vested Terminated Benefit Eligibility (Benefit Deferred to Age 50) — 20 Years

8. Disability Retirement Monthly Benefit for Firefighters Who Become Totally Disabled
   (a) For initial 30-month period:
      (i) For duty-related disability, benefit in item 1
      (ii) For off-duty disability, benefit in item 2
   (b) Following initial 30-month period, 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

9. Surviving Spouse's Monthly Death Benefit for a Firefighter Not Eligible for Service Retirement
   (a) Portion of monthly retirement benefit for other active firefighters following an on-duty death or an off-duty death with 10 or more years of service (benefit calculated with a minimum of 20 years of service) — Two-Thirds
   (b) Monthly off-duty death benefit for active firefighters with less than 10 years of service:
      (i) 5 to 9 years — $175
      (ii) Less than 5 years — $150

10. Surviving Spouse's Monthly Death Benefit for a Firefighter Eligible for Service Retirement: The monthly benefit the firefighter could have received on the date of death if the firefighter had elected the Joint and 100% Surviving Spouse optional form of payment (96% option factor). The 2-year RETRO DROP option is also available to surviving spouses of firefighters who were eligible for the RETRO DROP at the time of death

11. Surviving Children's Death Benefit
   (a) Monthly benefit per unmarried child — $1,360
   (b) Maximum monthly amount payable for all children — $1,360

12. Lump Sum Death Benefits
   (a) Payable for the death of an active firefighter — $35,000
   (b) Payable for the death of a retired firefighter or the surviving spouse — $12,000

13. Contributions as a Percent of Pay by:
   (a) Firefighters — 15.00%
   (b) City of Laredo — 21.10%[1]

14. The normal form of benefit payment at retirement is a Joint and Two-Thirds to Surviving Spouse, and payment is the last day of each month. A Joint and 50% to Surviving Spouse Option and a Joint and 100% to Surviving Spouse Option are available to married firefighters as optional forms of a service retirement benefit. Retirement benefit options are also available with a reduced initial monthly benefit that automatically increases each year.

[1] Increasing each October in 0.25% increments from 20.35% in October 2018 until it is 21.10% in October 2021.

15. Salary used to determine the Final (three-year) Average Monthly Salary includes all elements of pay except for all lump sum distributions for unused sick leave or vacation upon termination. The average is based on the highest consecutive 78 biweekly pay periods out of the last 104 biweekly pay periods.

16. Refund of firefighters' accumulated contributions without interest will be paid to firefighters who terminate employment and either are not eligible for any other benefit from the system or request a refund from the system.

17. An option to purchase military service prior to employment with the city as service credit under the plan is available.

Appendix A

Review of the Actuarial Economic Assumptions for the September 30, 2018 Actuarial Valuation

Asset Allocation and Investment Return Assumption Development

	Gross Annual Real Rate of Investment Return (ROR)[1]	Estimated Investment Expenses[2]	Net Real ROR	Asset Allocation 9/30/18 Actual[3]	Asset Allocation Current Target
Equities					
Domestic large cap	6.5%	0.76%	5.74%	15.4%	15.0%
Domestic mid cap	7.0	0.82	6.18	8.8	8.0
Domestic small cap	7.0	1.09	5.91	10.9	10.0
International developed	7.0	1.04	5.96	11.4	12.0
Emerging markets	8.5	0.65	7.85	9.5	10.0
				56.0	55.0
Fixed Income					
Domestic core	2.0	0.17	1.83	14.5	15.0
Domestic TIPS	2.5	0.59	1.91	4.7	5.0
				19.2	20.0
Alternatives					
Real estate	5.0	0.23	4.77	4.7	5.0
Absolute return	3.5	1.04	2.46	7.1	7.5
Long/short equity	5.5	1.09	4.41	7.5	7.5
Natural resources	8.5	1.02	7.48	5.0	5.0
				24.3	25.0
Cash	0.5	0.20	0.30	0.5	0.0
				100.0%	100.0%
Weighted Average Net Real ROR Assumption				4.96%	4.94%
Possible Theoretical Annual Investment Return Assumption (Total Net Annual ROR) – Net Real ROR Plus Assumed Annual Rate of Inflation					
Assumed 2.75% Inflation				7.71%	7.69%
Assumed 3.00% Inflation				7.96%	7.94%

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

[2] These assumed investment-related expenses are primarily based on information from the Fund Evaluation Group (FEG) as of September 30, 2018 for both direct and indirect expenses, with an addition of 0.03% for bank custody fees plus 0.06% for investment consultant fees.

[3] This allocation is from FEG's September 30, 2018 performance review and report.

Appendix A (continued)

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

Years (Dec. to Dec.)	Number of Years	Average Annual Increase
1953 – 2018	65	3.50%
1958 – 2018	60	3.67
1963 – 2018	55	3.88
1968 – 2018	50	3.99
1973 – 2018	45	3.83
1978 – 2018	40	3.33
1983 – 2018	35	2.63
1988 – 2018	30	2.48
1993 – 2018	25	2.20
1998 – 2018	20	2.16

Most inflation forecasts are for 10 years or less. For example, the average 10-year forecast in the December 2018 Livingston Survey published by the Federal Reserve Bank of Philadelphia was 2.23%. Similarly, the 2019 Wall Street Consensus Survey for the next decade included an average inflation forecast of 2.2%. However, 10 years is much too short a forecast period for a public employee defined benefit pension plan. In the 2019 annual report of the OASDI Trust Funds (Social Security), the ultimate inflation assumptions for their 75-year projections are 3.2%, 2.6%, and 2.0% 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 2.5% to 3.5%. Shorter term considerations make the bottom half of that range more desirable.**

General Administrative Expenses Paid by the System

Plan Year Ending 9/30	General Administrative Expenses Paid by the System	Estimated Payroll	% of Payroll (2) ÷ (3)
(1)	(2)	(3)	(4)
2018	$272,399	$36,107,647	0.75%
2017	310,945	34,061,980	0.91
2016	209,946	33,836,000	0.62
2015	239,505	30,951,480	0.77
2014	221,416	30,141,467	0.73
2013	234,887	30,363,226	0.77
2013-2018	$1,489,098	$195,461,800	0.76%

The general administrative expenses are not reflected in the investment return assumption but are reflected as a percent of payroll that is added to the normal cost contribution rate. For the September 30, 2018 actuarial valuation, we recommend 0.75%, the average developed above for the last six plan years rounded to the near multiple of 0.05%. (The estimated payroll was determined as the firefighter contributions for the plan year divided by the firefighter contribution rate during the plan year.)

Appendix A (continued)

Comparison of 9/30/2016 Actuarial Economic Assumptions with 9/30/2018 Actuarial Economic Assumptions

Actuarial Assumption[1]	9/30/2016 Actuarial Economic Assumptions	9/30/2018 Actuarial Economic Assumptions
Inflation (Price)	3.25%	2.75%
Net real rate of return[2]	4.65	4.75
Net total investment return[2]	7.90	7.50
Firefighter pay increase[3]	5.14	4.64
Aggregate payroll increase	3.25	2.75
GA expense (% of payroll)	0.72	0.75

[1] All assumptions are annual rates.
[2] Net of all investment-related expenses.
[3] For 9/30/2016, a 3.25% annual general pay increase plus 1.89% average annual promotion, step, and longevity pay increase over a 30-year career. For 9/30/2018, a 2.75% annual general pay increase plus 1.89% average annual promotion, step, and longevity pay increase over a 30-year career.